ENGINEERING NEWS
AND
AMERICAN RAILWAY JOURNAL.

Vol. XXXIV, No. 18.

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The prevention of the further pollution of the Passaic River has been under discussion for some months past by the health authorities of the New Jersey towns and cities bordering on the river and either contributing to or suffering from the bad condition of the stream. Acting under the leadership of the State Board of Health, a conference was held at Trenton in September to discuss this matter, and another at Passaic on Oct. 29. At the latter conference Dr. Henry Mitchell, Secretary of the State Board of Health, and representatives from some 15 or 20 local boards of health were present. It was decided to secure the introduction of a bill into the next session of the legislature authorizing and directing the State Board of Health to investigate the whole matter of the pollution of the river and devise some means of preventing the same. The proposed bill provides for the employment of engineers, the making of maps and plans, and authorizes the expenditure of $10,000 for the work. The following committee was appointed to secure the introduction and passage of the bill: Dr. J. L. Leal, of Paterson; Dr. G. W. Philhower, of Franklin; Mr. M. N. Baker, of Montclair, a member of the editorial staff of this journal; Dr. J. A. Exton, of Arlington; Dr. Chas. Leihbach, of Newark.

An official test of the electric cableway system of towing was made on the Erie Canal at Tonawanda, N. Y., Oct. 26, with satisfactory results. The motor running on the cables hauled seven canal boats at a speed of 3 to 4 miles per hour. The test section of cableway is one mile long, with wooden poles 125 ft. apart and 11 ft. from the edge of the canal. The upper cable, which carries the motor car, is 1¼ ins. diameter, and the lower cable, for the return current, ⅝ in. diameter, the cable being 3 ft. 2 ins. apart. The car has two sets of gearing, for three and six miles per hour, respectively, and is designed to haul one fully-loaded 250-ton canal boat at 6 ft. draft in 7 ft. of water at four miles per hour, or three boats at three miles per hour. The system is that of Mr. R. C. Lamb, Assoc. Am. Soc. C. E., as used for logging cableways in the South, and the plant was erected by the Trenton Iron Co., of Trenton, N. J.

The most serious railway accident of the week was a side collision on the Pennsylvania R. R., near Newport, Pa., Oct. 24. A broken axle on one car of an eastbound freight train is said to have caused several cars to jump the track and foul the westbound track, right in front of a westbound mail train. The engine, tender and four mail cars were derailed, the engine going into the canal alongside the tracks. The wreck caught fire, and four of the six mail cars were destroyed, together with a large amount of mail matter. The engineman and fireman were killed, and nine mail clerks injured, but none of these seriously.——A rear collision occurred Oct. 24 at Hyde Park, near Boston, Mass., on the Providence Division of the New York, New Haven & Hartford R. R., and about 25 persons were injured, two fatally. A train standing in the station was run into by a through express, owing, it is said, to some mistake in the signals, while no flagman had been sent back by the first train, which was late.

A burning trestle near Savannah, Ga., on the Florida Central & Peninsular R. R., gave way under a freight train, Oct. 24, and two men were injured; 14 cars went down.——A burning culvert near South Bend, Ind., on the Chicago & Grand Trunk R. R., gave way under a passenger train Oct. 26, and about ten persons were injured. Some of the cars caught fire and were burned. The culvert was on a part of the line which crosses the Kankakee marsh, and the weeds and grass of the marsh were on fire.

The bridge caisson at St. Augustine, Fla., which capsized recently, as noted last week, is to be raised, and it is said that the concrete which had been filled into it can be removed.

A train entered the Mount Parnaesse station at Paris, France, on Oct. 22 at such speed that it smashed the bumpers and crossed the platform at the end of the tracks, the engine and tender going through the outer wall of the station and falling into the Place de Rennes, 30 ft. below, killing a woman in the street and narrowly missing some street cars and omnibuses. None of the passengers were hurt. Newspapers reports ascribe the accident to the failure of the brakes.

The bridge between the ferryhouse and the floating pontoon of the Canal St. ferry at Algiers, La., gave way under a crowd Oct. 20, and a number of persons were thrown into the water. Two persons were drowned and several were hurt.

Four boiler explosions, a steam pipe explosion, and the wreck of an engine from water carried over from the boiler are recorded in press despatches from Oct. 17 to 22. Two boilers exploded during a fire on Oct. 17 at the Juniata Sand Co.'s works, a few miles east of Huntingdon, Pa., completely destroying the plant and causing a loss of $10,000 to $12,000. The boiler of Julius Peters's sawmill, eight miles southeast of Carrollton, Mo., exploded on Oct. 17, injuring four persons, one of them fatally. The fence picket factory of Coleman & Holmes at Lomax, Ill., was totally destroyed on Oct. 22 by a boiler explosion. Two persons were killed, and two others seriously injured. A boiler used in sinking a well at the county infirmary, two miles south of Warsaw, Ind., exploded on Oct. 22 while the attendants were at breakfast. It had no pressure gage nor safety valve. At the works of the American Wire Nail Co. at Anderson, Ind., on Oct. 21, a large steam pipe burst. Two hundred men were at work in the department where the explosion occurred, of whom ten were severely wounded, two of them possibly fatally. At the electric light station at Parkersburg, W. Va., on Oct. 21, an engine was completely wrecked and the steam pipe burst by water carried over from the boiler, causing a loss of $1,500.

The boiler of the tugboat "T. T. Morford" exploded on Oct. 26 while the boat was towing a vessel in the south branch of the Chicago River, killing three men and injuring two others. The boat was completely wrecked, and sunk in the river. The forward end of the boiler landed a block away, where it struck the engine house of the Armour elevator, tearing a hole in the wall 20 ft. square. The boiler was carrying only 75 lbs. pressure at the time of the explosion, although it was licensed to carry 105 lbs. Marine men attribute the explosion to the foul water of the Chicago River, with which the boiler was fed. The water in the river has been very low for some weeks, boats frequently run aground and stir up the mud on the bottom, and this mud is fed into the boilers with the feed-water.

Bids for the disposal of all ashes, garbage, sweepings and other refuse of the city of New York, delivered at the various dumps of the city, will be received by Col. Geo. E. Waring, Jr., Commissioner of Street Cleaning, until 12 M., Dec. 10. The contract will run for five years from April 1, 1896. Ashes, if clean, may be deposited within the cribwork of Riker's Island, in the East River. All other matter must be "disposed of in such manner only as will render it unobjectionable in any and every respect." It must not "be dumped in the waters of New York Harbor, or in the waters adjacent thereto, or in the Atlantic Ocean."

The defects in the cast iron columns of the St. Louis city hall have called out a report from Mr. Carl Gayler, M. Am. Soc. C. E., Deputy Commissioner of the Street Department, pronouncing the building unsafe. Mr. Gayler reports that the plans of Architect George Mann were faulty in design in columns, beams and girders. Smaller loads were assumed than were justified by the contemplated use. The actual weight of the floor was 115 lbs. per sq. ft.; while the architect used 125 and 150 lbs. for the aggregate of floor and superimposed load. Mr. Gayler thinks that 200 lbs. per sq. ft. may be too light for the work to be done. Under the above conditions, Mr. Gayler finds the beams and girders deficient in depth, and figures a deflection of ¾ in. to 1 in. in certain girders under the assumed weight of 200 lbs. per sq. ft. But the more serious fault is found to lie in the columns, which are all made of cast iron. Only 12 of the cast iron columns have yet been completely examined, but three cases were found where blow-holes were carefully plugged with iron cement, or lead. In one column a honeycomb extended a length of several feet, and in one place extended clear through the thickness of the column. Among the columns found defective were three which were subjected to abnormally heavy loads. The matter is now in the hands of the Board of Public Improvement of St. Louis.

A fast run was made on the Long Island R. R. Oct. 18 by a special train consisting of an engine and two cars, carrying Mr. Corbin, the President, and the officers of the road. The distance of 104 miles from Long Island City to Amagansett was covered in 110 minutes, including two checks. Among the passengers was Mr. Thomas Wood, President of the Milford Haven Dock Co., who is said to be interested with Mr. Corbin in establishing the long-talked-of line of mail steamers between Milford Haven and Fort Pond Bay.

A fast run was made on the Pennsylvania R. R., from Jersey City to Philadelphia, Oct. 24, to test the capacity of one of the new class P eight-wheel express engines (Eng. News, Jan. 17). The train consisted of seven Pullman sleeping cars, representing a load of 455,000 lbs. behind the tender. The run was made in 93 minutes, or 90 minutes, exclusive of a stop at Bristol to take water, owing to the fireman not having dropped the scoop in time to take water from the track tanks. The distance is 89.76 miles, and the average speed, exclusive of the stop, was about 60 miles per hour.

The block system is to be put in operation between Milwaukee, Wis., and Channing, Mich., 232 miles, on the Superior Division of the Chicago, Milwaukee & St. Paul Ry. There will be about 30 block sections, and work is to be pushed rapidly on the erection of the signals and operating plant. The growth of the ore and lumber traffic over this division is given as the reason for adopting the block system, but it is not stated whether it will be operated on the absolute or the permissive block system.

Plans and specifications for the new drainage system for New Orleans are to be prepared by Mr. L. W. Brown, City Engineer. At Mr. Brown's request, he has been authorized by the city council to engage three consulting engineers to advise him in this work. Mr. Brown has appointed Messrs. P. H. Hering, B. M. Harrod and H. B. Richardson. The proposed drainage scheme was described in our issue of May 30, 1895.

The water-works owned by the fire district of East Providence, R.I., have been sold to the East Providence Water Co., an unusual proceeding in these days of increasing municipal ownership. It appears that the town in which the fire district is located is heavily in debt and that there were other reasons of an unusual character to bring about the sale. A new stand-pipe connected with these works was first damaged and afterwards failed, as described in detail in our issues of Sept. 14 and 21, 1893; Jan. 25, Feb. 8 and 22, March 1 and 8 and May 10, 1894.

Legal proceedings to prevent the pollution of the water supply of St. Cloud, Minn., are reported as having been instituted against the city by the local water company. According to press despatches, the city recently ordered the construction of a sewer with an outlet 900 ft. above the water-works intake. The principal purpose of this sewer was to serve temporarily a parochial school, with some 600 attendants. A cesspool had been projected for the school, but its construction had been prohibited by the Board of Health. A temporary injunction has been issued, and work on the sewer has been stopped for the present.

The timber investigations being conducted by the Forestry Division of the U. S. Department of Agriculture, as to the properties of wood and tests of the strength of our commercial timbers, have been endorsed by a resolution adopted at the recent annual convention of the Association of Railway Superintendents of Bridges and Buildings, as tending toward a rational and needful economy of our forest resources and desirable improvements in their use, resulting not only in a great saving to users of timber, but especially offering a valuable guarantee for the safety of properly designed timber structures.

ERECTING VIADUCT TRUSSES WITHOUT FALSEWORK.

A very interesting example of bridge erection has recently been carried out at a point about seven miles west of Cleveland, O., consisting in the erection of a 10-span Pratt truss viaduct without the aid of falsework. The trusses were put together on the ground, and each truss was then hoisted to its place on top of the supporting towers, and held fast by the lines until the two trusses were connected.

The floor of the viaduct is 80 to 100 ft. above the valley which it crosses, and to erect falsework for placing the spans in the ordinary manner would have been very expensive, and would have involved much delay. The engineer in charge of the erection, therefore, decided to attempt the novel task of raising the trusses in position complete, and it was carried out with entire success.

FIG. 1. CHANNEL SPAN OF ROCKY RIVER VIADUCT; ERECTED BY RAISING TRUSSES COMPLETE FROM THE GROUND 80-FT BENEATH.

The King Bridge Co., Cleveland, O., Contractors. H. V. De Hart, Engineer-in-Charge.
R. N. Williams, Portsmouth, O., Contractor for Erection.

The viaduct is made up of one 114-ft. east shore span, one 162-ft. channel span, six 108-ft. west shore spans, and one 57-ft. plate girder span. All but the plate girder are trussed spans of the Pratt type, with a curved bottom chord, and are carried on steel towers varying from 40 ft. to 80 ft. high. These towers are made up of four latticed channel legs braced together, and are 26 × 18 ft., square at the top, with the legs battering in the ratio of 1 to 12 longitudinally and in the ratio of 2 to 12 transversely to the center line of the bridge. The trusses are spaced 26 ft. apart c. to c., and all the steelwork was designed for an electric railway load in addition to the usual highway loads.

The trusses of the channel span weighed about 35 tons each, and were erected complete as already noted. After the west shore tower had been erected, the traveler was run out on the east shore span and tower, and its engine used to lift the adjacent ends of the trusses which had been put together on the ground, 80 ft. below. The other ends of the trusses were lifted by means of a hoisting engine located on the ground at the foot of the west shore tower. From this engine 1½-in. lines ran to the top of a temporary wooden bent erected on the top of the tower just back of the bridge seats, and were rove through two triple-sheave blocks, making a set of falls having 16 parts. The triple blocks were lashed to the bent, and, of course, one end of the rope was attached to the end of the top chord of the truss. A similar tackle was rigged on the boom of the traveler and attached to the other end of the truss.

The two trusses were erected on the ground by supporting the top chords on bents consisting of two batter posts and a short cap, and then placing the other members in the usual manner. After erection the trusses were hoisted one at a time by working both engines, care being taken to keep both ends as near the same level as possible, and lateral motion being prevented by using guys on either side.

After the trusses were erected the floor beams were set and other connections made by means of the traveler in the usual manner. Figs. 1 and 2 show the traveler at work.

The other trusses were erected in a similar manner; and while the channel span required about seven hours to raise, the better facilities for handling the guy lines, and the experience gained, enabled some of the other spans to be raised in less than an hour.

The hoisting engines used for this work were made by the John F. Byers Machine Co., of Ravenna, O., and are especially designed for bridge erection work. The cylinders are 5¼ × 7 ins., set vertically. The spools are operated by friction clutches, and each spool, with its shaft, is independent of all the others, thus enabling the full power of the engine to be exerted on any spool, when all the others are loaded and at rest. Friction clutches on each spool enable it to be stopped and started at will while the engine runs continuously, and an automatic pawl engages with each spool when it is not in motion. The total weight of the engine and boiler used on this work was only 6,500 lbs., but it handled the heaviest trusses without difficulty.

The viaduct was manufactured by the King Bridge Co., of Cleveland, O., and Mr. R. N. Williams, of Portsmouth, O., was the contractor for erection. Mr. H. V. De Hart superintended the work as engineer-in-charge for the King Bridge Co.

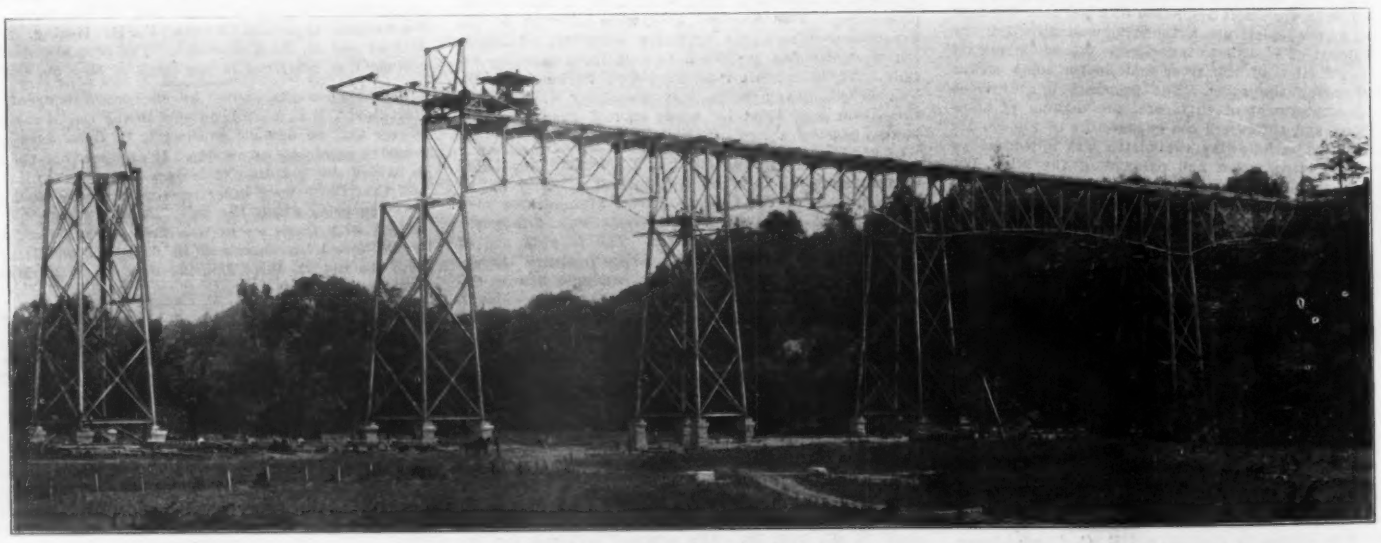


FIG. 2. SHORE SPANS OF ROCKY RIVER VIADUCT.

An electric plow is described and illustrated by U. S. Consul Otto Doederlein, of Leipsic, in the "Consular Reports" for October. This plow is claimed as being more applicable to small farms than the steam plow, owing to lighter and more portable construction and greater economy in use. The plant includes an ordinary portable engine, triple ground anchors, a chain, a portable dynamo machine, two or four-share plows, carrying an electric motor, and small cars for supporting cables conveying current from dynamo. For small farms an engine and dynamo are used which develop about 11 E. HP. When plowing at the rate of about 3 ft. per second, making two furrows 24 × 9½ ins., 7.8 E. HP. was actually consumed in plowing, showing a loss of 3.2 HP. in transmission of power and tooth and chain friction. This loss is claimed to be much less than with steam plows. Plowing 8 acres in 10 hours, on heavy soil, the cost was $1.29 per acre, as compared with $2.74 for the same work done by oxen. For large farms the economy is, of course, greater. These plows are made by Zimmermann & Co., of Leipsic. Copies of the "Consular Reports" containing the description can be obtained be addressing the Department of State, at Washington, D. C.

LOCAL ANNEALING OF HARD-FACED ARMOR PLATES.*

By Hermann Lemp, Jr., M. Am. Inst. El. Engrs.**

One of the latest advances in the making of protective armor has been the introduction of what is known as the Harvey process. For those not conversant with the latter, I will briefly state that it consists in introducing an additional percentage of carbon into the surface metal of an ordinary low carbon steel plate, thus changing the crust to the depth of about an inch into a steel resembling tool steel. A plate thus treated is lastly water-hardened, similarly to an ordinary tool, and experience has shown that it offers more resistance to the impact of a projectile than any other armor known. The extreme hardness of the surface of a Harvey plate, while exceedingly valuable in preventing projectiles from piercing it, has a disadvantage when it is required to be pierced by a drill and tap. Such holes may be required either for fastening ladders, swivels or other appliances to the hull of the vessel, or to fasten T-flanges supporting the deck to barbettes or turrets. The methods heretofore used to produce these holes have been principally two:

1. To protect the surface of the plate in patches or strips, to prevent carburization, wherever holes are expected to be drilled.

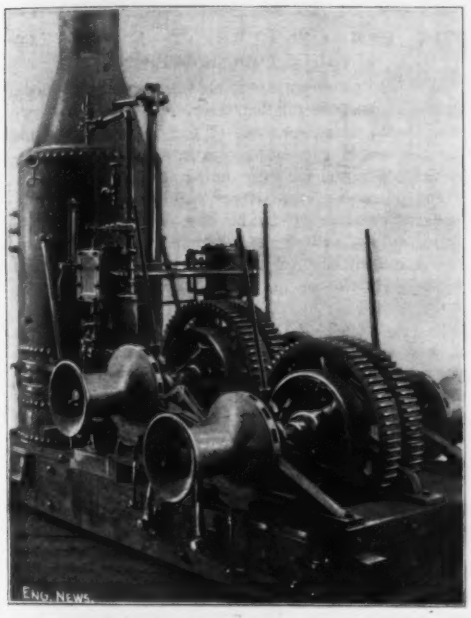


Fig. 3. Byers Hoisting Engine Used in Erection of Rocky River Viaduct.

2. To make accurate drawings and patterns of each plate beforehand, according to which all holes are drilled before the plate is hardened.

Plan No. 1 was practiced in the United States until it had to be abandoned. In practice it was found that numerous alterations in construction, errors in either drafting-room or mills, made it necessary to pierce holes where no provisions for annealing were made. It also happened quite frequently that the method for prevention of carburization did not work satisfactorily. Hence it was patent from the first that some process was needed to rectify errors of this kind. Experiments were then made with oxy-hydrogen blowpipe, or the electric arc, to anneal such spots as were required to be drilled, and numerous mechanical devices for drilling with drills of every design and method of tempering were tried, until continued non-success made the case seem without a remedy. It was at this stage that the problem was referred to the Thomson Electric Welding Co., of Lynn, and experiments were immediately undertaken to solve it. The process and apparatus evolved from these experiments will be described presently.

The second method, which is used in England, has the advantage over the first that there is no difficulty in carrying it out, provided there are no alterations made and no errors committed. The present method of construction seems to be to construct, beforehand, a complete model of the vessel to be built; then to make accurate drawings and full-size patterns of every plate, giving the exact location of every hole. These are then bored, tapped and countersunk to a depth of approximately ⅝ in., and of a much larger diameter, filled with clay, and the plate as a whole is then heated and hardened with water. This method works well, apparently, although, in spite of drawings and models, errors are made. There is no doubt, however, that it is a slow and very costly method of working, and would very seldom be employed in the United States.

From the above it seems clear that there has existed a need for a process by means of which isolated spots, regardless of location, might be annealed so as to permit drilling and tapping. If, by sending a current of large volume through any spot thus to be treated, that portion is brought to a temperature of approximately 1,000° F., there can be no doubt that the temper has been withdrawn. Experiments at once showed, however, that upon taking off the current, the heat was so rapidly conducted away by the surrounding metal masses as to cause the heated spot to become chilled just as effectually as if it had been plunged into cold water. No method of outside protection of the heated spot would prevent this, and the gradual cooling had to be attained by different means—namely, a gradual and slow withdrawing of the heating current. The method of introducing the annealing current is best shown in Fig 1. C C are two copper contacts cooled by water circulating inside. The current enters the plate by one, and leaves it by the other. The contact tips are spherical in shape, and the expansion of the steel causes the area of surface in contact to become about ½ sq. in. Right under the contact, the metal comes to a bright cherry heat (shown in black), while the portion intervening and partly surrounding the contacts acquires a temperature of just a visible red. Line H H indicates where the influence of the Harvey treatment stops. The shaded portion in Figs. 1 and 2 shows the zone softened and ready to be machined, while the dotted line shows how far the heat radiation would cause the metal to turn blue. When cooled, the annealed portion shows a chocolate color, while the place where the contacts have been resting is scaled and hard, and cannot be touched by a tool to a depth of about ¼ in. These places can again be annealed later on, if required.

The apparatus necessary to carry out this process consists of the generator, the annealer proper (transformer) and the regulating apparatus. The generator is commonly a separately excited alternator of variable potential, of a maximum of 300 volts and 100 amperes. The frequency, preferably, should be low, 50 cycles per second being used. When more than one annealer is to be run simultaneously from one generator, constant E. M. F. of the latter should be used and each annealer regulated separately by a reactive coil. The annealer proper is a transformer similar to the well-known welding transformers. It has a ratio of transformation of 100 to 1, and the E. M. F. in the secondary is about two volts. Two trunnions are fastened to its sides, in a line a little above the center of gravity, which trunnions swing in bearings, part of a yoke which straddles the whole. The yoke in its turn has a hook which may be secured to the latter at any point of the arch, thus allowing the transformer to be suspended, like a compass in gimbals, in any position desired. The weight of the whole annealer, approximately 1,000 lbs., is sufficient to give proper contact pressure for all work on a horizontal plate. When inclined surfaces, vertical or otherwise, are to be worked upon, the transformer is suspended so that its weight shall not interfere with the contact pressure, which is obtained for work by bracing the contacts directly with wooden wedges against any object near by. On the outside of a hull, it is proposed to use a pair of electromagnets, which are made to hold themselves against the iron hull, and form a support for the annealer.

The remarkable thing in regard to this process is the great amount of current that is carried by the copper contacts into the plate. The contact surface is seldom more than ½ sq. in., and yet 10,000 amperes are made to flow through it continually. This is equivalent to 40,000 amperes per sq. in., a density which is only possible on account of the thorough cooling by the water circulation.

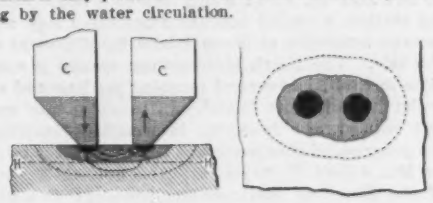


Fig. 1. Fig. 2.

Action of Annealing Electric Current on Hard Faced Armor Plate.

The regulating apparatus is in most cases simply a rheostat in series with the field of the generator. When more annealers than one are run simultaneously from one generator, as mentioned before, a reactive coil is interposed between the two, and this latter has been made automatic; that is to say, provided with a dash-pot which permits the current to be reduced uniformly and at any given rate that the apparatus may be set for.

The annealing operation is carried out as follows: The transformer is placed in position, the contacts touching the plate either side of the place marked to be annealed, and the primary current brought up by means of a rheostat to from 75 amperes to 90 amperes for about two minutes, according to the size of spot to be annealed, which will bring the metal to a dull red heat, a temperature at which a pine stick catches fire when held in contact with the plate. If no reactive coil is used, the current is now diminished by turning the rheostat one point every minute. If the reactive coil is used the same effect is produced automatically by the slow descending of the core in the dash-pot within the solenoid of the coil. The operation generally takes seven minutes, all told. No difficulty has been experienced from the beginning. The annealing of individual spots was, however only the stepping-stone to more important work of a similar nature—work which was about to be given up, owing to what were considered insurmountable difficulties.

In the construction of a modern man-of-war, there are many armor plates which act as shields to the guns, and have to be perforated to allow the gun muzzle to pass through and to be either raised or lowered. To perforate these shields after carburization and before being water-hardened was the only possible way, since previous experiments had shown that prevention of carburization could not be relied on, and no process was known to anneal the plate locally after hardening. The hardening of a plate once perforated, showed itself to be, however, almost impossible. In most cases the plate cracked or became distorted in such a way that it could not be used. As individual spots for holes could be annealed, there could be no doubt that a series of annealed spots might be likewise obtained by the electric process, following a line along which a cutting tool was expected to be run. The first attempt, therefore, was to anneal a number of spots in proximity to each other in such a way that the annealed zones should overlap each other. As described above, it is very important that the temperature of any individual part should be gradually and slowly withdrawn; and while for individual spots the only possible way was to do this by gradually diminishing the current, it was obvious that when a line was to be annealed, instead of annealing a number of spots side by side, the same effect of withdrawing the heat gradually from one portion could be obtained by moving the apparatus itself relatively to the plate to be treated. The rate of this movement depended upon the rate at which the temperature should be allowed to fall in any particular spot to prevent chilling. The apparatus was therefore arranged to be moved along a line to be annealed, the motion being obtained by an ordinary screw and nut held in a bracket, the nut being turned at a predetermined rate controlled by a watch. It was found that a speed of about ¼ in. per minute was sufficiently slow to insure thorough annealing. The copper contacts were of the simplest kind as described above, bedding themselves partially in the surface, and when dragged along by the screw and nut, raised in front of themselves a burr or chip similar to that produced by a planing tool. After a whole day's continuous use the copper contacts were found intact, while a number of chips from the steel surface were lying about. We thus had the peculiar phenomenon of a hard steel chip cut with a copper tool. Upon the completion of the work, it was found that a strip about 2¼ ins. wide throughout the length over which the machine had been moved, could be operated upon by drills or a shaper, in a manner as easily as if it had never been hardened.

In the work just described, the apparatus was moved about, but in regular practice it would be better to construct a machine consisting of a large bed, on which the plate to be treated could be fastened and moved in any direction automatically at a predetermined speed, while the annealer proper is suspended in a given position above the plate. The annealing operation requires but a small percentage of the time necessary for cutting.

It is unnecessary to state that when the apparatus is used for continuous annealing, the primary current is kept at a nearly constant value, the diminishing of heat at any individual spot being obtained solely by the moving of the apparatus from it.

The apparatus may also be used for the reversal of the annealing process; that is, for creating isolated hard spots in soft tool steel by sending a current through the spot to be hardened until it reaches a bright cherry heat, and then suddenly removing the current or machine. Various other applications will suggest themselves in the operation of this process, already adopted by the United States Government. It may be used in the construction of burglar-proof safes, for dies and punches, for projectiles, and other articles of a similar nature.

* Abstract of a paper presented at the meeting of the American Institute of Electrical Engineers at New York, Oct. 23.

** Electrician, Thomson Electric Welding Co., Lynn, Mass.

THE NEW UNITED STATES GOVERNMENT LOCK AT SAULT STE. MARIE, MICH.

IV.

Power House and Pumping Machinery.
(With Inset.)

In our issue of Sept. 26 we described the construction of the walls and floor for the new U. S. Government lock at Sault Ste. Marie, Mich., and in the issues of Oct. 10 and 17 we illustrated in detail the construction of the large steel valves and gates for controlling the admission of water to the lock chamber. The pumping machinery for emptying the lock chamber and a general plan and elevation of the power house are shown in the accompanying cuts and on our inset sheet this week. In a succeeding issue full details of the hydraulic pumps and engines for operating the valves and gates will be illustrated.

Power House.—The power house is located at the southeast end of the lock, and is to be built of Kelly's Island limestone. Fig. 1 shows the east elevation of the building, and gives a very fair idea of its general architectural features. It may be noted that the tower on the south side serves the purpose of concealing from view the steel smokestack from the boiler plant in the basement. Fig. 2 is a plan of the basement showing the general location of the steam and hydraulic power plants.

Pumping Machinery.—The pumping machinery for emptying the lock chamber consists of three 30-in. and one 10-in. centrifugal pumps, three Westinghouse compound engines and two 375-HP. Babcock & Wilcox boilers. The location of the engines, boilers and pump-well is shown on the basement plan of the power house, Fig. 2, and the general arrangement of the machinery in the pump-well, and details of one of the 30-in. pumps are shown on the inset sheet.

Each of the three 30-in. pumps is operated by a Westinghouse compound engine, having 18-in. high-pressure and 30-in. low-pressure cylinders and 16 ins. stroke. The 10-in. pump is fitted with a pulley at the upper end of the shaft, and is driven by a belt from one of the turbines for operating the pressure pumps of the hydraulic gate and valve machinery. The illustrations show clearly the arrangement of the gearing and shafting. All four pumps discharge into a single outlet pipe emptying into the lower level of the canal below the lock gates. The three 30-in. pumps are used to handle the main bulk of the water when emptying the lock chamber, and the 10-in. pump for taking away the leakage and draining the lowest levels.

Each of the two Babcock and Wilcox boilers for supplying steam has three steam drums 36 ins. in diameter and 23 ft. long, and is so arranged as to be operated independently. The shells are made of ⅝-in. open-hearth steel, with a specified tensile strength of between 54,000 lbs and 60,000 lbs. per sq. in., and a minimum elastic limit of 30,000 lbs. per sq. in. The location and dimensions of the steam pipes to the engines are shown on the basement floor plan of the power house, Fig. 2. Further details of the construction and operation of the pumping machinery are shown by the drawings.

THE TAYLOR MOTOR CAR WHEEL.

A car wheel with a chilled cast iron flange and a steel tread is an interesting novelty recently introduced by Mr. W. J. Taylor, of the Taylor Iron & Steel Co., High Bridge, N. J. Its construction is shown in the accompanying illustration. The body and the flange of the wheel are of cast iron, the flange being chilled by a contracting chill. The steel tire forming the tread is welded in while the wheel is being made, the tire being heated before being placed in the mold, so that the melted cast iron is easily welded to it by fusion of the surface of the tire, as the cast iron flows against it. After the wheel is made the tire is turned in a lathe to make it conform to the flange and throat.

The object of the combination of a chilled iron flange with a steel tread is to put into the flange and tread respectively the metals which are best adapted to resist flange wear and wear and flattening of the tread. In electric motor car service with chilled iron wheels it has been found that the tread is liable to flatten under severe brake service and often to wear rapidly, while with all steel wheels, even of hard steel, the flange is liable to wear rapidly, while the tread does not flatten, and wears well if steel of a proper temper be used. It is claimed that a steel motor wheel has more frictional resistance to sliding on the track than a

The Taylor Motor Car Wheel.

chilled iron wheel, and consequently enables a greater traction to be exerted by the motor. This superiority of a steel tread is said to be especially noticeable in snowstorms, when a motor car with steel wheels will drive a snow plow with greater ease than a car with chilled wheels, and keep a road open more readily in severe snowstorms. The Taylor wheel, having a chilled flange and a steel tread, combines the particular advantages of the chilled and the all-steel wheel. The wheel is a "one-run" wheel; that is, it cannot be trued up when the flange is worn out, but it is a comparatively cheap wheel to make. Twelve of these wheels are now in use where the service is very severe, and their performance will be watched with much interest. Should they make a good record, it is possible that they may be applied to steam railway cars as well as to motor car service.

THE METROPOLITAN SEWERAGE SYSTEM FOR BOSTON AND VICINITY.

The bulk of the work on the great trunk sewers designed to serve a part of Boston and 17 other cities and towns has been completed, and both the north and south systems are now in use. These systems were described at length in Engineering News of Jan. 25, Feb. 8, May 3, 10 and 17, 1895. The Charles River, or South Metropolitan, system connects with the outlet sewer, forming a part of what was formerly known as the Boston Main Drainage Works (see Eng. News, Jan. 5 and 26 and May 10, 1894), which include a large pumping station, a tunnel beneath Dorchester Bay and storage reservoirs at Moon Island for discharge at ebb tide. The North Metropolitan system is complete in itself, has several pumping stations and an outlet just off Deer Island. In response to a special request, the following information regarding the progress of this work has been furnished to us by Mr. Albert F. Noyes, M. Am. Soc. C. E., one of the Board of Metropolitan Sewerage Commissioners:

Sir: In reply to your favor of Oct. 15, in regard to the completion of the Metropolitan sewerage system, I would state that the whole system as originally designed and proposed by the State Board of Health in their report of 1889, with the exception of about 300 ft. of a small branch sewer, is at the present time in operation. There remains to be constructed about 12½ miles of intercepting sewer in the valley of the Neponset River to provide for the drainage from the Dorchester and West Roxbury districts of Boston, from the towns of Milton, Hyde Park and Dedham, and from a small part of Newton and Brookline. This last extension of the sewer system was ordered by the state authorities at the last session of the legislature.

The South Metropolitan, or Charles River, system has been in operation since the spring of 1891, a part of the North Metropolitan system was put in operation June 1, 1895, and a portion of the system controlled by the Charlestown pumping station has been in operation since Sept. 23, 1895.

The cities and towns contributing sewage at the present time to the North Metropolitan system are Cambridge, Everett, Malden, Medford, Woburn, Boston, Winthrop, Melrose, Winchester and Belmont. Arrangements are being made for making connections with the sewerage system of other cities and towns in this district.

The amount of sewage received from the North system during the past month was about 4,000,000 gallons per day, and it is estimated that during the coming year the amount to be received will be from 16,000,000 to 20,000,000 gallons per day. The ultimate capacity of the works is about 135,000,000 gallons per day. The whole system is working in a very satisfactory manner.

THE USE OF CURRENT METERS IN MARINE OBSERVATIONS.

In a late progress report on tides and currents in Canadian waters, the Engineer, Mr. W. Bell Dawson, C. E., describes some of the difficulties attending the use of current meters in a seaway and the methods adopted for overcoming them.

The purpose of the survey referred to was to obtain information regarding the currents along the main route of sailing vessels in the Gulf of St. Lawrence and off the Atlantic Coast. Inshore currents were not followed in detail, and the bulk of the work was done at the two main entrances to the Gulf—the Strait of Belle Isle and Cabot Strait. As it was not possible to devote a vessel to each entrance, to make simultaneous surveys, one vessel divided its time between the two for the three months devoted to this work. The vessel employed was the steamer "Lansdowne," of 463 tons registered tonnage; 180 ft. long by 32 ft. beam and 13½ ft. ordinary draft. The maximum speed was 10 knots.

After first checking the accuracy of the patent log against measured runs on the chart, this log was used to ascertain the direction of currents by making runs between accurately determined starting and ending points. The actual course steered was determined from the average of readings taken every 10 to 15 minutes on a Thomson binnacle compass. The leeway was either eliminated or allowed for.

As the shore currents usually extended one or two miles out, to avoid complications with these, the lines selected were never less than three miles, and often as much as 10 to 20 miles off shore. The position of the vessel when anchored was ascertained by sights from shore, or astronomically, at the most favorable opportunity for weather, and these determinations were repeated as frequently as possible to guard against dragging anchors. The anchorage depths ranged from 30 to 40 fathoms, in the Strait of Belle Isle, to 260 fathoms in Cabot Strait, and a wire-rope hawser was used in the greater depths, as a small anchor would then usually hold. The anchor rope was led over a large bow pulley, and an accumulator or compressor was introduced between the pulley and the midship point of attachment. This compressor was intended to take up the motion of the ship; it was made of 60 rubber disks of 5 ins. diameter, with a total length of 12 ft., and under greatest compression 8 ft. 8 ins. long. It was modeled after the one used on the U. S. Survey steamer 'Blake," described by Lieut. Pillsbury, in Appendix 10, Report of 1890, U. S. Coast Survey.

The currents observed seldom exceeded two miles per hour; but in heavy winds it was difficult to avoid dragging, especially in the Strait of Belle Isle, where the bottom appears to be the smoothest rock, possibly polished by the passage of icebergs. The electric current meter was used in obtaining the velocity and direction of currents. In moderate working weather the "Lansdowne" made a complete double roll in from 6 to 7 seconds, and in this

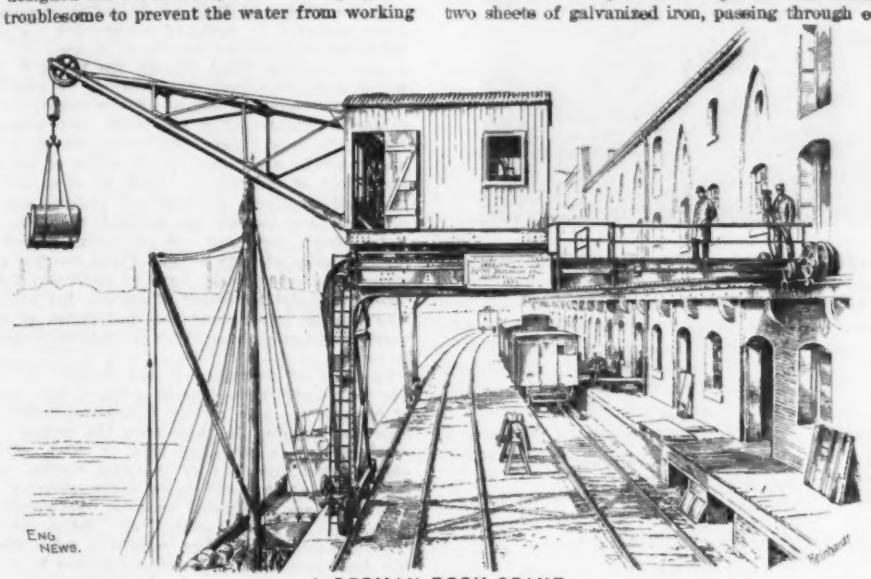
interval the meter was raised and lowered some 2 or 3 ft. through the water. With a wave-height exceeding 5 to 6 ft. the meter could not be depended upon to register correctly, as the roll was too great. To counteract this difficulty, the meter was finally suspended over the side by a rope carried over a large pulley on a davit and attached at the opposite side of the deck. A weight was attached to the horizontal part of this rope which depressed it and allowed sufficient play over the pulley to compensate for the roll. The electric wires were led independently to the meter.

Mr. Dawson briefly calls attention to some of the difficulties encountered in using electric meters, primarily designed for river work, for marine purposes. It is troublesome to prevent the water from working into the "air-chamber"; but this was overcome by filling this chamber with oil, which was sufficiently non-conducting to prevent short-circuiting and also served to equalize the pressure at considerable depths. Sea water has a higher conductivity than fresh water, and at first great difficulty was experienced in having binding-posts, etc., in contact with the water on the down-current. It was found necessary to have the down-wire completely insulated and all connections imbedded in rubber cement throughout. With these alterations the horizontal meter worked successfully; but the vertical fan meter used had so large an air-chamber and so many binding-posts that all efforts to employ it electrically failed, and an extemporized mechanical counter was attached which served its purpose.

For continuous work in tidal currents the usual dry-cell batteries were not suitable, as the power decreased too rapidly. To obviate this trouble, more cells were used than were required and the current was reduced by a resistance coil, which could be varied from 1 to 10 ohms to balance the varying tension of the battery. While the motion of a ship would mix the two liquids in a gravity battery, the ordinary zinc-carbon battery was found to work satisfactorily, and gave a steady, constant current.

In use, the meter was lowered clear of the keel of the vessel to avoid interference with the current; and in these surveys a uniform depth of 18 ft. was adopted for surface currents, as it was found that there was little appreciable difference in the strength of the current down to 5 fathoms (30 ft.) from the surface. At this depth of 18 ft. the meter could always be seen distinctly and its position showed the direction of the current. This direction was also obtained by using an open triangle of wood, weighted on one edge, covered with gauze and employed as an attached float. This latter device was especially useful at night when the meter could not be seen.

In this survey the shores were usually too distant to permit shore sights upon small buoys or floats, for current determination. The best adaptation of this river method was found to be to start the float from the anchored steamer and determine its path by bearings and distances relatively to the steamer. For determining the velocity of undercurrents, two similar floating buoys were employed; and from one of these a fan was suspended, at any required depth, which presented a large surface to the water. The two buoys were started together and the difference in motion observed. These buoys were cylindrical in form, about 5 ft. long by 6 ins. in diameter and weighted to stand vertically in the water, and upon each was an upright staff carrying two horizontal disks set exactly 5 ft. apart. The form of the float avoided undue vertical wave-motion, and the disks enabled the distance to be determined at any moment by using a Rochon micrometer telescope. The deep fan was made of two sheets of galvanized iron, passing through each other at right angles and supported by a light wooden frame; it was just heavy enough to sink. A deep-sea sounding wire connected the fan with the float, and it was mostly used at depths of 30 and 40 fathoms.



A GERMAN DOCK CRANE.

A GERMAN DOCK CRANE.

Some of our American crane builders may perhaps get an idea in the design of cranes for dock fronts from the accompanying cut, which we have redrawn from a not very good half-tone in the "Zeitschrift des Vereines Deutscher Ingenieure." The "walking crane" has found frequent applications abroad, but has never come into general use in this country. The machine shown in the cut would seem to be admirably adapted to work in transshipping cargo from freight cars to vessels alongside, or vice versa, and it can cover any length of dock front at a very moderate expense for fixed plant. The common type of traveling crane in this country is the bridge crane, and it is doubtless the best for covering the interior of shops. But where all points in a large material yard or a system of tracks are to be reached, it is worth considering whether it would not be cheaper and better to make the trestle a part of the crane and not part of the fixed plant. This seems to be a very common practice for outdoor cranes in Germany, and it needs little study to see that it has some excellent features to commend it.

The crane illustrated is operated by electricity. It was built for the railway company by Mohr & Federhoff, and is one of a pair which are operated on the water front. The two are alike except in the motors. The crane shown in our cut has a single non-reversible motor, and motion is reversed by a friction clutch arrangement. In the other crane two motors were used, running in opposite directions.

A FAST RUN ON THE LAKE SHORE & MICHIGAN SOUTHERN RY.

A railway run which eclipsed every previous record of high speed for a long-distance run, was made on the Lake Shore & Michigan Southern Ry., from Chicago, Ill., to Buffalo, N. Y., on Oct. 24. The train was a special, made up of three Wagner drawing-room cars, representing a load of 304,500 lbs. behind the tender. Engines were changed four times. On the first four divisions the engines were of the eight-wheel type, similar to those used in 1893 on the "Exposition Flyer," as shown in our issues of June 15 and July 6, 1893, and weighed 104,000 lbs., or 184,000 lbs. including the tender. On the fifth division, from Erie to Buffalo, a 10-wheel engine was used, weighing 114,000 lbs., or 198,000 lbs. including the tender. The total length of the run was 540 miles, but the record time was taken for only 510 miles, as fast time cannot safely be made near Chicago, owing to the work of elevating the tracks in the city, and the crossing of numerous railways and a drawbridge in the neighborhood of the city. The train left Chicago about 2 a. m., and arrived at Buffalo at 11:30 a. m., some of the passengers then going on by the regular Empire State Express, leaving Buffalo at 1 p. m., and arriving at New York at 10:15 p. m. They thus made the entire trip of 980 miles in 18 h. 15 min., including a stop of 1½ hours at Buffalo. We now have a record run from New York to Buffalo, on the New York Central R. R., as described in detail in our issue of Sept. 19, and a record run from Chicago to Buffalo. The next thing may be a record run over the whole structure between New York and Chicago, as noted in our editorial column.

It will be seen by the accompanying record that very high intermediate speeds must have been obtained during the run, the averages being all above 60 miles per hour, while the average on the last division, of 86 miles, was 72.91 miles per hour. The highest speed recorded was one mile at the rate of 92.3 miles per hour. Besides the four regular stops to change engines, there was an additional stop of 2 min. 5 sec. on the Toledo Division, the train having been flagged. This railway is well fitted for fast running, large sums of money having been spent in the improvement of grades and curves, and in putting in heavy track and block-signal equipment.

We have compiled the figures of this interesting run in tabular form, and are indebted to Mr. W. H. Canniff, General Superintendent, for the official statement as to times and distances:

Record of Special Train from 100th St., Chicago, to Buffalo Creek Station, N. Y.; L. S. & M. S. Ry., Oct. 24, 1895.

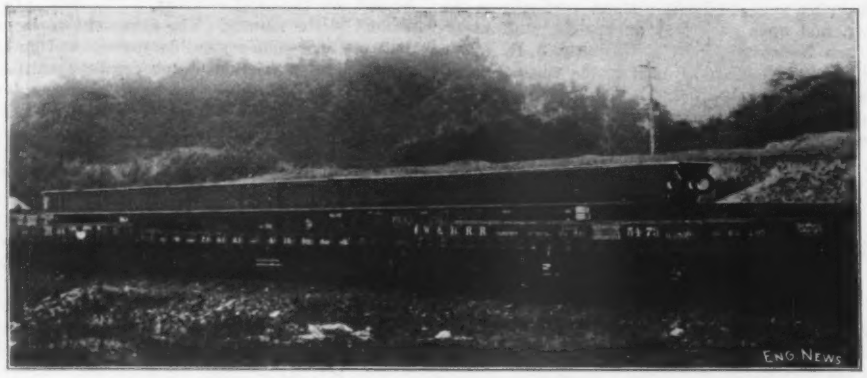
	Time, A. M. H. M. S.	Miles.	Elapsed time. Min. Sec.	Time of stops. Min. Sec.	Speed, miles per hour.
Leave Chicago (100th St.)	3 29 27	....	.. ..	.. ..	.....
Arrive Elkhart	4 54 53	87.4	85 26	.. ..	61.38
Leave "	4 57 04	....	.. ..	2 11	.....
Arrive Toledo	7 01 32	133.4	134 35	.. ..	64.24
Leave "	7 04 07	....	.. ..	2 28	.....
Arrive Cleveland	8 50 13	107.8	106 06	.. ..	60.96
Leave "	8 51 58	....	.. ..	1 45	.....
Arrive Erie	10 17 30	95.5	85 32	.. ..	66.90
Leave "	10 19 48	....	.. ..	2 18	.....
Arrive Buffalo (Buffalo Creek Station)	11 30 34	86.0	70 46	.. ..	72.91
Extra stop by flag on Toledo Division	.. .. ..	....	.. ..	2 05	.....
Total, stops deducted		510.1	470 20	10 47	65.07
Total, start to finish, including 5 stops, 24 slow-downs for railway crossings and 14 other slow-downs		510.1	481 07	.. ..	63.61

Train.

Three drawing-room cars	304,500 lbs.
Eight-wheel engine and tender (104,000 and 80,000 lbs.)	184,000 "
Total with eight-wheel engine	488,500 lbs.
Ten-wheel engine and tender (114,000 and 84,000 lbs.)	198,000 "
Total with ten-wheel engine	502,500 lbs.

A VERY HEAVY BRIDGE MEMBER.

Plate girders which require two or three cars for their transportation are no longer a novelty in this country. It is something decidedly out of the ordinary, however, to see a single member of a pin-connected structure so large and heavy as to exceed the capacity of a single car. We illustrate herewith what is claimed to be the heaviest member of



END POST FOR FIXED SPAN OF DELAWARE RIVER BRIDGE; WEIGHT, 97,000 LBS.

a pin-connected span that has ever been shipped in a single piece. It is an end post for one of the fixed spans of the new Delaware River Bridge, now under construction at Philadelphia for the Pennsylvania R. R. The post is 87 ft. 8 3-16 ins. long c. to c. of end pins, and weighs 97,000 lbs. The cover plates are 46 ins. wide, and its depth, out to out of angles, is 31 ins.

The bridge was briefly described and illustrated in our issue of Dec. 27, 1894. It is to be a double-track, through-truss, pin-connected structure, with three fixed spans, each 533 ft. c. to c. of end pins.

Our illustration is reproduced from a photograph taken Sept. 17, for which we are indebted to the courtesy of Mr. Percival Roberts, Jr., M. Am. Soc. C. E., Vice-President of the Pencoyd Iron Works, who are the contractors for the superstructure.

DIAGRAM FOR CALCULATING STRESSES IN ROOF TRUSSES.

We illustrate herewith a diagram for calculating the stresses of the different members of a common style of roof truss when various pitches of roof are used. This diagram has been worked out by Mr. Wm. G. Miller, of East Berlin, Conn., and forms one of a series of similar diagrams designed by him to cover several of the more common styles of roof trusses. The single diagram shown explains the use of all in the series. In some manufacturer's pocket books coefficients are given for trusses of ⅛ — 30° — ¼ and 1-5 pitches. By means of Mr. Miller's diagrams the coefficients for any intermediates are also readily obtained. Those who wish to study particular styles of trusses can correspond with Mr. Miller. In Fig. 1 the heavy lines indicate compressive stresses and the light lines tensile stresses, and the lettering of each member corresponds to the lettering of the curve relating to that number in Fig. 2. These curves are all designed for a uniform load on the truss. The method of using the diagram is simple. To find the stress in Hh for a roof of 1-5 pitch, note where the curve lettered Hh crosses the vertical line denoting that pitch, and read off on the axis of ordinates the coefficient of total load, which in this case is 0.681. Multiply this coefficient into the total load, and the product is the stress in the member. For any other member or another pitch of roof the process is exactly the same.

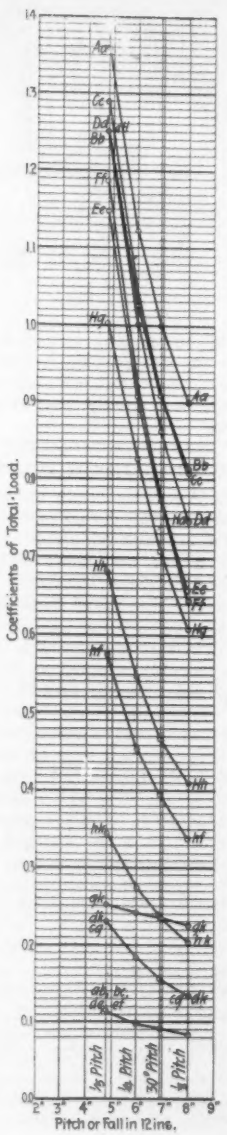


Fig. 2.

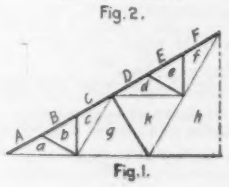


Fig. 1.

RECENT EXPERIMENTS WITH HEAT TESTS FOR CEMENT.

The value of accelerated tests—generally heat tests—of hydraulic cements to determine their durability has been much discussed in recent years. In our issue of Aug. 24, 1893, we reviewed at some length the various accelerated tests practiced, and outlined briefly such conclusions as the evidence at that time seemed to warrant. The question is an important one to cement users and manufacturers. The durability of a cement is, of course, a far more important factor than its strength within reasonable limits, for it matters little how great a strength a cement may develop, if in a few months or years it will disintegrate and fall to pieces. Any method of testing, therefore, which will enable an engineer to know beforehand what durability may be expected of a cement is of great value.

Heat tests have shown much promise in this respect, although they have been little adopted, and, indeed, have been vigorously opposed by many very competent engineers. They are, however, we believe, gaining more and more the attention of cement users, both in this country and abroad. In the report of the French Commission on uniform methods of testing materials of construction,* recently issued, the subject is discussed briefly by Mr. H. Le Chatelier, who takes the extensive experiments of Prof. L. Tetmajer, of Zurich, as the basis for his remarks. The following is an abstract of Mr. Le Chatelier's discussion:

In the course of time all hydraulic cements and limes employed in works of construction are disintegrated by the various influences of nature. The longer a cement resists these attacks the better it is. It would seem important, therefore, to be able to ascertain by tests the degree of this resistance. The causes of disintegration are many, but may be divided into two classes: (1) Those which act only under certain conditions, as the action of sea water, frost, heat of the sun, etc.; and (2) those which act under all conditions, as water and carbonic acid. The action of these last are less energetic than that of sea water, frost, etc., and are dangerous according to the continuity of their action. These two last agents, water and carbonic acid, have an important influence upon the initial hardening of cement, but act in the long run to bring about the destruction of certain cements, but only those which are inherently defective in quality.

The test of durability or invariability of volume has for its object the determination of the resistance of cements to these various destructive influences or agents of nature. In these tests the cement is generally molded in good-sized pats, or cakes, with thin edges. This formation of the pats renders the deformations which occur more easily observed. The alterations are manifested by total disintegration, or more often by cracks, scaling, etc. Often these phenomena require a long time, months or years, for their full development. For practical purposes it is necessary that the phenomena be developed much quicker.

Mr. Tetmajer proposes to employ heat to bring about this quicker action, since in all chemical reactions the action of heat accelerates the process. Five methods of heat tests have been compared by Mr. Tetmajer. In all cases the hydraulic cements or limes were gaged in the form of pats and placed during setting in a moist atmosphere. The pats were subjected to test at the end of 24 hours if they had set before that age, otherwise immediately after setting.

I would point out here two grave defects in this mode of operation. The settling of the water, inevitable in briquettes hardening in air, causes a very great difference between the upper and lower parts. This effect is more marked as the rate of setting is slower. The uniform preservation of all pats for 24 hours, some of which set in a few minutes, others at different ages up to 24 hours, establishes an inequality of conditions. The resistance at the moment of immersion and the action of the hot water are very variable in the different tests.

The tests were as follows:

(1) Tests in Cold Water.—Pats varying from 1 cm. thickness at the center to nothing at the edges, and 1 dm. in diameter preserved for three years.

(2) Tests in Air.—Pats like those for the cold water tests preserved in a moderately moist atmosphere under a uniform temperature for three years.

(3) Kiln Tests.—Pats of the form before described placed on supports in a vessel having several millimeters of water in the bottom. Heat was applied gradually, so that the water was evaporated in from three to six hours. So long as the water was evaporating the temperature was about 95° C. After evaporation the heat was continued one-half hour until the temperature was 120° C. Under these conditions the interior of the pats did not rise to a higher temperature than 100° C.

I would remark that this manner of operation cannot be easily made comparable with itself, as it is impossible to apply the heat at exactly the same rate in every test. Moreover, after the evaporation of the water, the temperature near the bottom of the vessel is greater than near the top.

(4) Red Heat Tests.—A ball several centimeters in diameter placed upon a frame and subjected to a gas flame. The heat was regulated so that at the end of the first half-hour the temperature of the ball was that of the hand, and after the second half-

*Commission des Methodes d'Essai des Materiaux de Construction. Tome IV.: Section B, Materiaux d'Aggregation des Maconneries. J. Rothschild, Editeur, Rue des Saints-Peres, Paris.

hour 90° C., and then at the same rate until the ball was red hot.

It is hardly necessary to say that this test is less easily regulated than the kiln test.

(6) Cooking or Boiling Test.—The ball placed in a vessel of water over the fire, and the water brought to the boiling point in 1½ hours and kept boiling for six hours.

This is the only heat test proposed by Mr. Tetmajer in which it is possible to secure the same conditions in all cases.

The experiments were made with Portland cements, slag cements, natural cements and hydraulic limes, and the results were as follows:

Portland Cements.—Of 139 cements tested, two only showed signs of disintegration after three years in cold water. In the tests in air, 18 altered completely and 7 showed less marked disintegration. The boiling or cooking test destroyed 17 cements completely, and developed cracks in 11 more. All the cements disintegrating in air were destroyed by the boiling test, but while the disintegration in air became evident only after a year, it was developed by boiling in six hours. A certain agreement appears to exist between the time necessary to develop disintegration in air and in boiling water. The cements which disintegrated in air in less than six months could not resist the boiling water more than four hours, and those which stood in air only a few days disintegrated in boiling water in less than two hours. The results obtained do not permit of any definite relations being deducted on this point. The kiln tests and red heat tests give results identical with the boiling tests. In conclusion, it may be said that the results of the tests on Portland cement demonstrate that for such cements the boiling test is excellent. It gives in six hours the same results that a test of a year's duration in air does.

Slag Cements.—All 46 cements tested showed no change in cold water. In air 5 were much disintegrated and 15 less markedly so. The results of the tests in air vary between themselves according to the degree of humidity. The boiling test gave no case of absolute disintegration, but five cements developed cracks, all five being those which had failed in air. The kiln and red heat tests gave less marked results than the boiling test. In conclusion, it may be said that the boiling test is still of interest, but not so good a proof as for Portland cements. It disintegrated the slag cements which were certainly bad, but not those which were doubtful.

Natural Cements.—Both quick and slow-setting cements were tested, 45 cements in all. All proved sound in cold water and in air. In the boiling test 13 were destroyed completely and eight were cracked. The kiln and red heat tests showed less marked results. Mr. Tetmajer concludes that neither of the three heat tests is suited to natural cements, and proposes a hot water test of 50° C. With this test none of the cements would fail. I consider the results too peculiar to be accepted without verification. Natural cements are always more irregular and less to be calculated upon in their action than artificial cements. It is difficult to believe that out of 45 cements selected at hazard none was bad. Moreover, several of the cements were natural Portland cements, presenting all the characteristics of veritable Portland cements, and it is not easy to understand how a test excellent for the one should be directly the contrary for the other.

Hydraulic Limes.—Of the 104 limes tested 10% showed more or less pronounced disintegration in cold water and air. In boiling water 30 disintegrated completely and 20 cracked. In the kiln and red heat tests the failures were as numerous, but less pronounced than in the boiling test. Mr. Tetmajer concludes that these heat tests are not suitable to hydraulic limes, and proposes, as for natural cements, the hot water test at 50°C. I do not consider this conclusion absolutely justifiable. The failure in boiling water of limes which stood in cold water was always with slow-setting limes. They were surely immersed before true set had taken place.

It appears from these tests that the use of the hot water gives a really accelerated test, since it is ended in six hours. No hydraulic lime or cement notoriously bad can escape the boiling test. It remains to prove that all cements unable to stand the test are really bad.

EQUIPMENT OF ROLLING STOCK WITH AUTOMATIC BRAKES AND COUPLERS.

On Jan. 1, 1898, every railway which moves a freight car in interstate traffic which is not equipped with automatic couplers will be liable to a fine of $100, and to a similar fine for every locomotive engine without driving-wheel brakes, and for every train moved without enough air-brake cars in it to control its speed. That this law means exactly what its text indicates, the experience which the railways have had with the section of the law requiring grab irons and standard height drawbars to be in use on July 1, 1895, ought to make pretty clear.

It is of great interest, therefore, to know what progress the railways are making in the equipment of their rolling stock to comply with this law. The only statistics on this subject, however, are those of the Interstate Commerce Commission, and these are not published until they are about 18 months old. We have just received from the Statistician to the Commission an advance statement of the figures for the year ending June 30, 1894, and it may be stated at once that they show a disappointing falling off in the equipment with brakes and couplers during that year, due to the cramped condition of railway finances.

Automatic Couplers.

The total number of freight cars in service on June 30, 1894, was 1,245,060, of which 320,572 were equipped with automatic couplers, according to returns to the Commission. These figures err in two ways. They include, first, a considerable number of old automatic link-and-pin couplers, which, while they may perhaps fulfill the conditions of the law, are practically certain to be refused in interchange when the law goes into effect. In the second place, these figures omit the cars owned by private companies, such as refrigerator cars, stock cars, etc., of which there are probably 50,000 or more now in service, and a very large proportion of which are already equipped with M. C. B. couplers and air-brakes.

From the table showing the number of cars with different kinds of automatic couplers, we have made up the following table, giving the makes of couplers in most general use:

Kind of coupler.	No. of cars equipped on June 30: 1894.	1892.	1890.
Janney	117,781	81,876	36,615
Gould	77,278	41,272	10,807
M. C. B.	40,078	18,426	10,756
Miller	17,770	19,525	19,879
Chicago	15,440	7,294	.....
Trojan	12,793	3,575	.....
Van Dorston	12,572	13,926	2
Buckeye	10,649	1,689	.....
Safford	9,798	8,215	1,981
Hinson	7,864	6,380	1,900
Smith	7,358	7,846	5,440
Dowling	7,068	7,248	2,021
Thurmond	3,821	2,793	3,041
Standard	3,234	924	356
Williams	2,155	1,023	.....
Pooley	1,876	50	.....
Marks	1,559	3,180	1,963
Mather	1,500	1,400	.....
Blocker	1,385	1,480	1,379

It will be seen in this table that the statistician has not gone behind the face of the returns at all, and there is no possible method of telling what makers furnished the 40,000 equipments put down under "M. C. B." Freight and passenger cars are lumped together in the above table, which accounts for the Miller couplers reported. The Safford, Marks and Blocker couplers are of the link-and-pin type, and ought not to be reported to the Commission at all as automatic couplers. The report bears signs, however, that the railways which return couplers of this type to the Commission, as if they complied with the law, are either removing them and putting on M. C. B. couplers, or else have concluded it was not worth while to report them as if they actually complied with the law. A good example of this is the old Ames coupler, an automatic link-and-pin, with which 11,808 cars were reported equipped in the Commission's report for 1889. In the report for the year 1894 this has been cut down to 371. Of course this is very misleading to any one who wishes to ascertain the fact of real importance—the progress in equipment with couplers of the M. C. B. type.

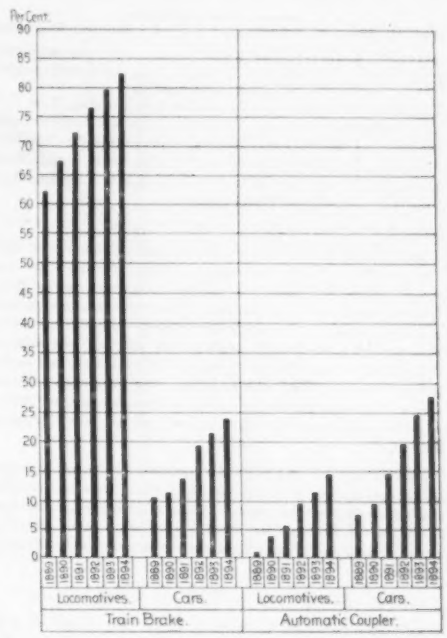
Train Brakes.

The figures in the report show that out of a total of 1,245,060 freight cars in service on June 1, 1894, 269,350 were equipped with train brakes. The error in these figures by the inclusion of brakes which do not meet M. C. B. requirements is much smaller than in the case of couplers, but the error by omission of the private cars is equally large. The table showing the kinds of brakes in use is chiefly of interest as a curiosity, as it shows to what a small extent the several competitors of the Westinghouse Co. succeeded in securing business before the Westinghouse patents were passed on by the courts.

The following are the figures for the companies best known:

Kind of brake.	No. of cars equipped June 30, 1894.
Westinghouse	315,729
New York	10,314
Boyden	1,690
Lansberg	1,283
Turner Beard	95
Crane	2

The statistician has evidently expended a great deal of labor upon the figures which he presents, and has attempted to classify them in the most useful form. It is to be regretted that his efforts were not made with a better understanding of all the facts and circumstances, so that his results



Progress in the Equipment of Railway Rolling Stock with Automatic Couplers and Air Brakes.

From the Statistics of the Interstate Commerce Commission.

(Heavy vertical lines show percentages equipped.)

might have had greater accuracy. We have redrawn, and present herewith, the diagram which accompanies the report, showing graphically the progress in brake and coupler equipment for several years. In examining it, the fact should be borne in mind that it represents the conditions of 16 months ago, and that it contains the various errors above noted. These are, however, by no means so large in comparison with the totals as to destroy the value of the diagram.

Various sanitary problems are being actively discussed in Cleveland, both the Civic Federation and the Medical Society of that place having recently held public meetings for this purpose. At the meeting of the Civic Federation, Mr. Walter Rice, formerly City Engineer of Cleveland, discussed the relations between lake currents, the sewage and water supply of the city. Mr. Rice favored continuing the discharge of sewage into the lake at the most advantageous point or points. He thought chemical precipitation would be insufficient as a safeguard, and if any purification was to be attempted, favored filtering the water supply. The meeting of the Medical Society was in two sessions, afternoon and evening, and among the subjects and speakers were the following: "The Disposal of Sewage and Garbage," by Mr. Cady Staley, President of the Case School of Applied Science, Cleveland; "Diseases Arising from Improper Disposal of Sewage and Garbage," by Dr. C. O. Probst, Secretary Ohio State Board of Health; "General Sanitation," by Col. Geo. E. Waring, Jr., M. Inst. C. E., Commissioner of Street Cleaning, New York city. Regarding the necessity of awakening the public to the need of improved sanitation, Dr. Wirt, President of the Cleveland Medical Society, is reported as saying: "We have no system of garbage collection; our sewers empty into the river, and the filth is carried into the lake, diluted and pumped back through the water mains." A flushing tunnel to increase the current and volume of the Cuyahoga River is under discussion, and an extension of the water intake tunnel seems assured.

ENGINEERING NEWS
AND
AMERICAN RAILWAY JOURNAL.

Published every Thursday at Tribune Building, New York. Entered at the Post Office, New York, as Second Class Matter.

D. McN. STAUFFER, CHARLES WHITING BAKER.....EDITORS.
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ALFRED E KORNFELD, New York.....
F. A. PECKHAM Chicago.....ADVERTISING REPRESENTATIVES

PUBLICATION OFFICE.....Tribune Building, New York.
CHICAGO OFFICE.....1636 The Monadnock.
LONDON AGENCIES: KEGAN PAUL, TRENCH, TRUBNER & Co. (Limited), Paternoster House, Charing Cross Road; SAMPSON LOW, MARSTON & Co. (Limited), St. Dunstan's House, Fetter Lane.

SUBSCRIPTION RATES: United States, Canada and Mexico, One Year, $5.00: 6 months, $2.50: 3 months, $1.00: single copies, 15 cents. To all other countries in the Postal Union, add $2.08 per annum (4 cents per number) to above prices for postage. No club rates allowed. Mailing addresses may be changed at will by sending both old and new address. We shall be obliged if subscribers who fail to receive their papers promptly will notify us without delay. The date when the subscription expires is on the address label on each paper: the change of this to a subsequent date is the only receipt sent, unless by special request.

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We are pleased to notice that our London contemporary, "Engineering," in an editorial on the America's Cup races and racers, pays a hearty and manly compliment to American yacht designers, and especially to the "Defender" and its creator. It says point blank that the trials showed a decided superiority for the "Defender" as compared with her rival, and vigorously declares that this was no more than might have been anticipated. The "Defender" is built of bronze and aluminum, while the "Valkyrie" is of composite construction, her frame being of metal and her skin of wood. The lighter construction of the "Defender," says our contemporary, allows her to carry a greater weight of ballast to make up for the narrower beam. She has thus stability equal to a broader vessel built of heavier material, and can carry equal sail spread, which naturally drives the narrower hull at a greater speed. It is probable, continues the editor, that the "Defender" excels not only in the general broad features of the design, but through minute attention to every little detail. The reason why the American yacht builders beat the British every time is discussed at length, and great credit is given to the native genius of the Herreshoffs. The time is recalled when the first Herreshoff torpedo boats came to England, and the later time when their vedette boats and steam cutters were ordered by the British Admiralty, and far eclipsed in speed the English boats of the same class. The article continues as follows:

> We fear it will be long ere the America Cup makes a voyage back across the Atlantic. In the first place, the challenging yacht is under such great disadvantage, and in Nathaniel G. Herreshoff the Americans have a designer who seems to have been brought into the world and trained for the express purpose of keeping the cup in America. . . . That is the man we have to beat before we can get back the America Cup. Observant, thoughtful, level-headed, as much at home at the tiller as in the designing office, with a scientific training and an instinctive perception of the shape a boat should be to go easily through the water and carry her canvas. Shut him up alone in a room, there is not a detail in the vessel he cannot design; put him in the workshop, there is not a part he cannot construct with his own hands. But these things, although essential to the highest type of yacht designer, are, in our opinion, subordinate to the abundant resourcefulness, the brilliant inventive faculty, which has always distinguished the New England race, and which finds highest exemplification among such men as the Herreshoff Brothers. It is here, we think, that our own yacht designers have failed. We have lived through the old style when the clever builder of fishing boats—whose drawing instruments consisted of a piece of chalk, and whose mathematics stopped at the multiplication table, if they went so far—was the yacht architect, and now our designers can calculate displacements, stability, centers of effort on lateral resistance, and other elements of design with the best. But, British-like, we are still too much hide-bound by traditions of the past. . . . We much fear that some of our existing yacht architects have not the knowledge of mechanical principles, and of the qualities of metals and alloys which will enable them to cope with the well-informed and quick-witted Yankees.

There is only one other point to which we shall make reference. In sailmaking we in England are far ahead of the Americans. That we think is acknowledged, and what would have been the relative positions of the two yachts had they been canvassed alike is not pleasant to contemplate. It was not always like this, for a great part of the "America's" success was attributed to the better setting of her sails. We gather from Mr. West's photographs that the "Defender's" mainsail has horizontal cloths. That seems a foolish thing, but in any case the British-made canvas is far superior. If, therefore, we could get out a hull equal to the Americans', before they can train up a good sailmaker, we might win the cup, but to do that English yacht designers will have to study the properties of materials more closely than they have hitherto.

The results of the experiments of Professor Tetmajer, of Zurich, to ascertain the efficiency of heat tests for determining the soundness of cements, which are summarized on another page, deserve the careful consideration of engineers. These tests have the valuable feature of being comparable with the action of the same cements tested under normal conditions. A cake of each cement tested by heat was also placed in cool water and in moist air for a period of three years, for the purpose of determining whether the slower action of disintegration under normal conditions would confirm the results obtained by the very rapid action induced by heat. With the exception of the experiments by Mr. Fred. P. Spalding, M. Am. Soc. C. E. (Eng. News, Aug. 24, 1893), which were much less comprehensive, these are the only tests in which this valuable feature has been introduced. The opponents of heat tests have made much of this weak point in the tests made in the past, and it is gratifying to note that it is being studied with the view of definite settlement. Taken as a whole, Professor Tetmajer's experiments cannot be called decisive, although they serve to establish heat tests on a firmer basis and give much hope of establishing ultimately their reliability as a practical test for the soundness of cements. It is also interesting to note that the boiling-water test is fully as efficient as the more severe kiln and flame tests. As we noted in the discussion of Mr. Spalding's tests, the total dehydration of a cement briquette by baking or by heating it red hot seems illogical, considering the important part which moisture is supposed to play in the hardening of cement, even after the so-called final setting. We are inclined to believe that a hot-water test—that is, with the temperature considerably below 212°, or boiling—will be fully as efficient as the boiling test. Mr. H. Le Chatelier seems to sum up the heat test pretty fairly when he says: "No hydraulic lime or cement notoriously bad can escape the boiling test. It remains to prove that all cements unable to stand the test are really bad."

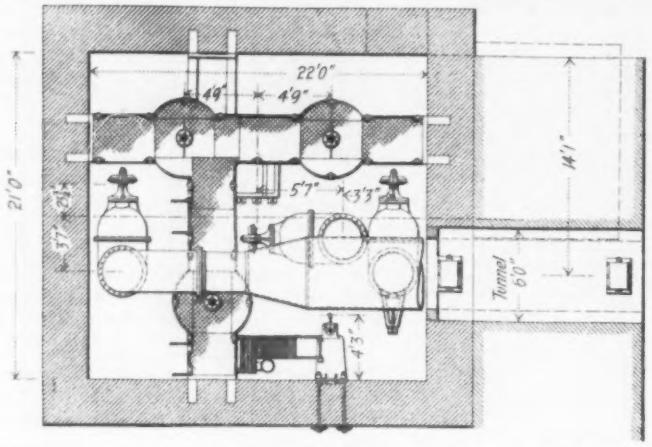
The report of the Interstate Commerce Commission's statistician for the fiscal year ending June 30, 1894, given in abstract in this issue, makes a most unfavorable showing of the railway situation for the year covered. It is to be hoped that this report indicates the lowest point in the business depression, so far as it affects the country's railway interests. The Commission does not expect that any very great degree of improvement will be shown in the report for the year ending June 30, 1895, but indications point to some gain. With $154,222,887 less income to spend in 1894 than in the preceding year, resulting from loss of business, economies were forced upon the railway corporations, and these economies were chiefly made in enormous reductions in the amounts expended in the maintenance of way and of structures and equipment, the total decrease in expenditure for these items being $49,570,373. The decrease in money spent for conducting transportation was almost as much more, but this decrease was in great part a natural result of the falling off in business. Economy in the maintenance of way and in equipment cannot continue long in railway economics without permanent injury to the property, and it is in this direction that it is natural to look for efforts advantageous to the industrial world. The present increased activity in car building and in the manufacture of general railway supplies would indicate that the limit of economy has been reached, and that prospects immediately ahead warrant the large expenditures made imperative by two years of forced neglect.

The report also makes it plain that the railway corporations have been making heroic, if questionable, efforts to maintain the value of their securities by borrowing 54 cts. for every dollar dealt out in "dividends." This is one, and not an uncommon, way of upholding corporate values, but a heavy debt is incurred that can only be extinguished by a very marked revival of traffic, and it only adds to the obligations legitimately incurred in the maintenance account.

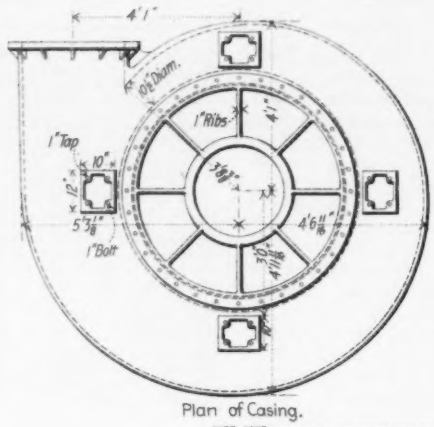
The statistician again calls the attention of railway corporations to the delay in complying with the law of 1893, calling for the equipment of all cars with automatic couplers and train brakes by January, 1898. Practically only two years remain in which to complete this work, and yet less than 26 per cent. of the total cars in freight service were equipped with automatic couplers, and a still smaller percentage with train brakes. But in the year and a half since these statistics were collected, there has been very great activity in the equipment of cars with both brakes and couplers. It is, we believe, safe to assume that, making due allowance for old cars, which can be kept in use for local traffic only without infraction of the law after Jan. 1, 1898, the equipment of 700,000 cars in the next two years will satisfy the requirements of the law. This is, indeed an enormous task, but it is one which the railways must attempt, or face a worse alternative. From present appearances, while there will be not a few delinquent companies, who will have to beg for further "days of grace" when Jan. 1, 1898, comes round, a good proportion of the companies, including some of the most prominent, will have their equipment practically completed by that time.

We are rapidly building up a new navy, second to none in the power and efficiency of its individual vessels; but it is already apparent that we have an insufficient number of well-trained engineer officers to handle these ships, or even to keep them in decent repair. Engineer-in-Chief Melville has long been urging a radical increase in this respect; but blocked by tradition, dry-rot, or some other equally lamentable condition in the Navy Department and in Congress, he has, so far, urged in vain. The hardship imposed upon the engineers in the service by the existing scarcity of officers may be appreciated by the statement that no more engineers are stationed upon the cruiser "Montgomery" than were upon the old single-screw steamer "Vandalia," though the "Montgomery" has from three to four times the amount of moving machinery, in addition to the many auxiliary engines, so important upon a modern warships. But while the heavy burdens imposed on the individual engineer officers seemed to awaken little sympathy, another condition, or consequence, has developed, according to a late communication of Engineer-in-Chief Melville, that is calculated to force the attention of the Department and of Congress, and to more rapidly bring about reform. This is the fact that there are now not enough of officers to keep our new ships in efficient cruising and fighting condition; necessary repairs are accumulating, and the delay is rapidly increasing the cost of work of this character. Even now, several of our new ships should go out of commission, on account of defects that could have been prevented had the "stitch in time" been taken. In other words, the deficient number of engineer officers is making itself felt in increased repairs, and consequent expense. Serious breakdown, which is at any time likely to occur, on account of this deficiency, will be sure to touch the popular pride in our new navy, and those responsible will then hear from the people, who pay for these ships. Hence, we may expect some definite action on this head from the next Congress.

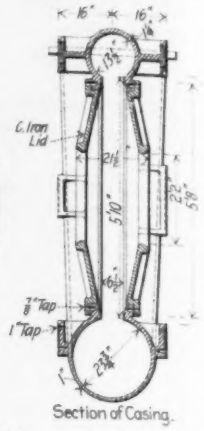
Apparently, Congress and those Navy Department officials who have opposed the increase in the number of engineer officers, have never fully grasped the radical difference between modern men-of-war and the ships of the old navy which they re-



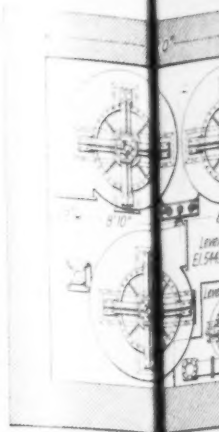
HORIZONTAL SECTION THROUGH PUMP WELL AT LOWER FLOOR.



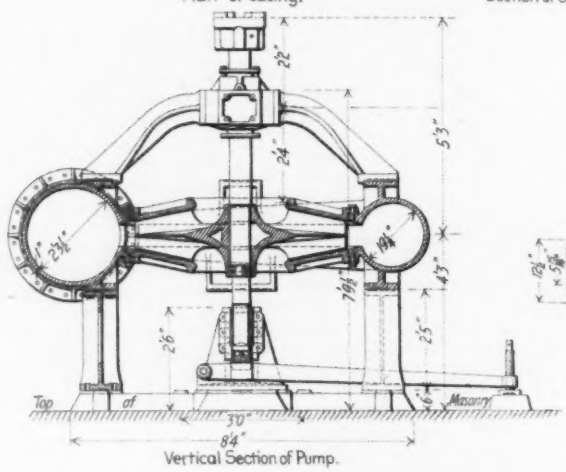
Plan of Casing.



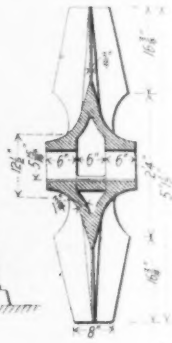
Section of Casing.



HORIZONTAL SE
THROUGH PUM WELL

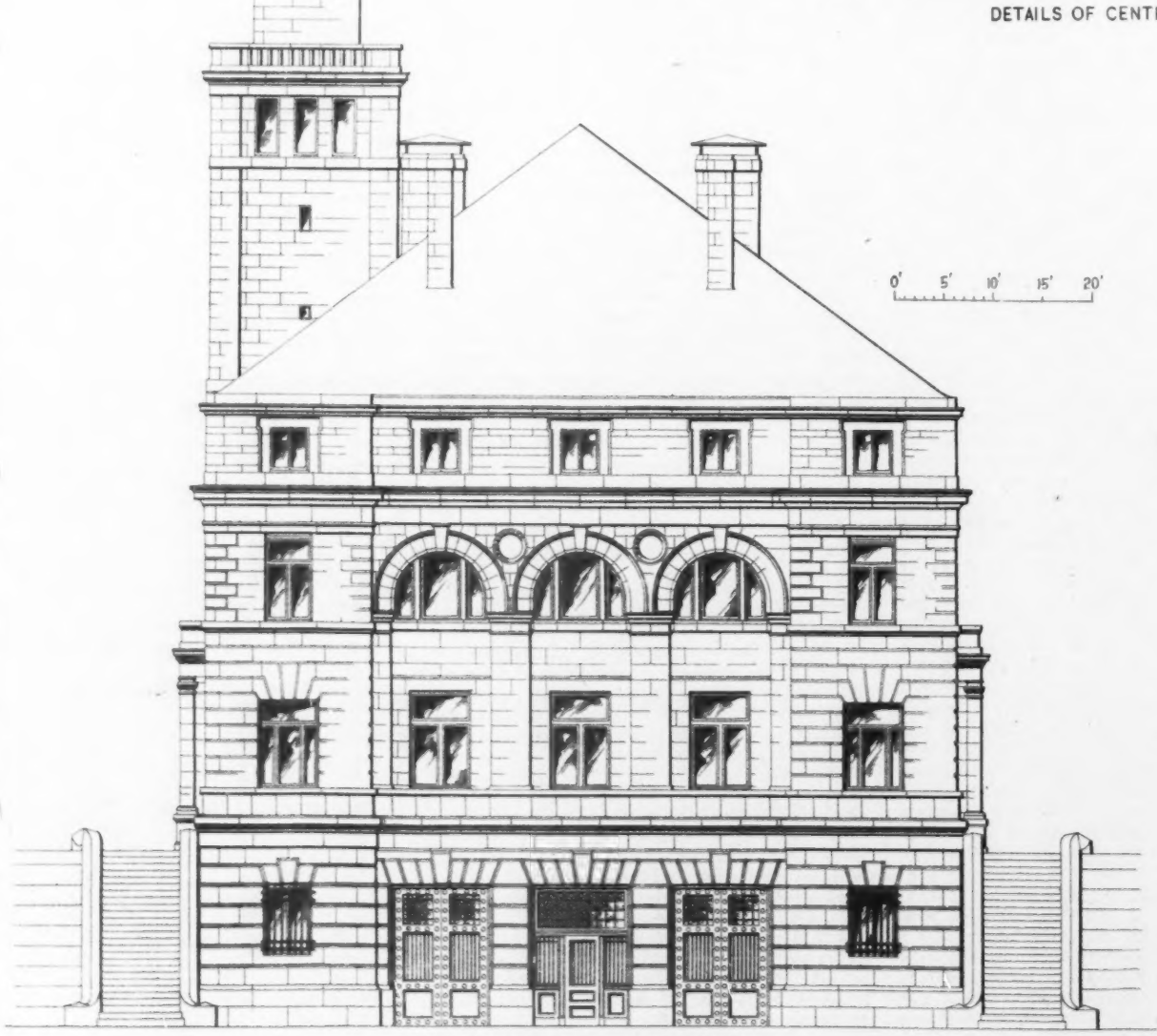


Vertical Section of Pump.

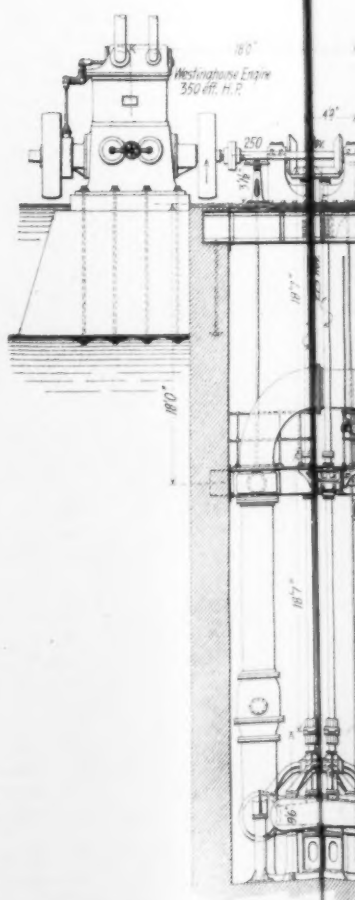


Cast Steel Runner.

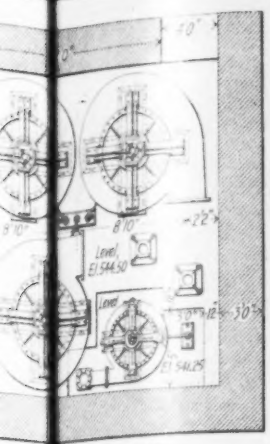
DETAILS OF CENTRIFUGAL PUMP.



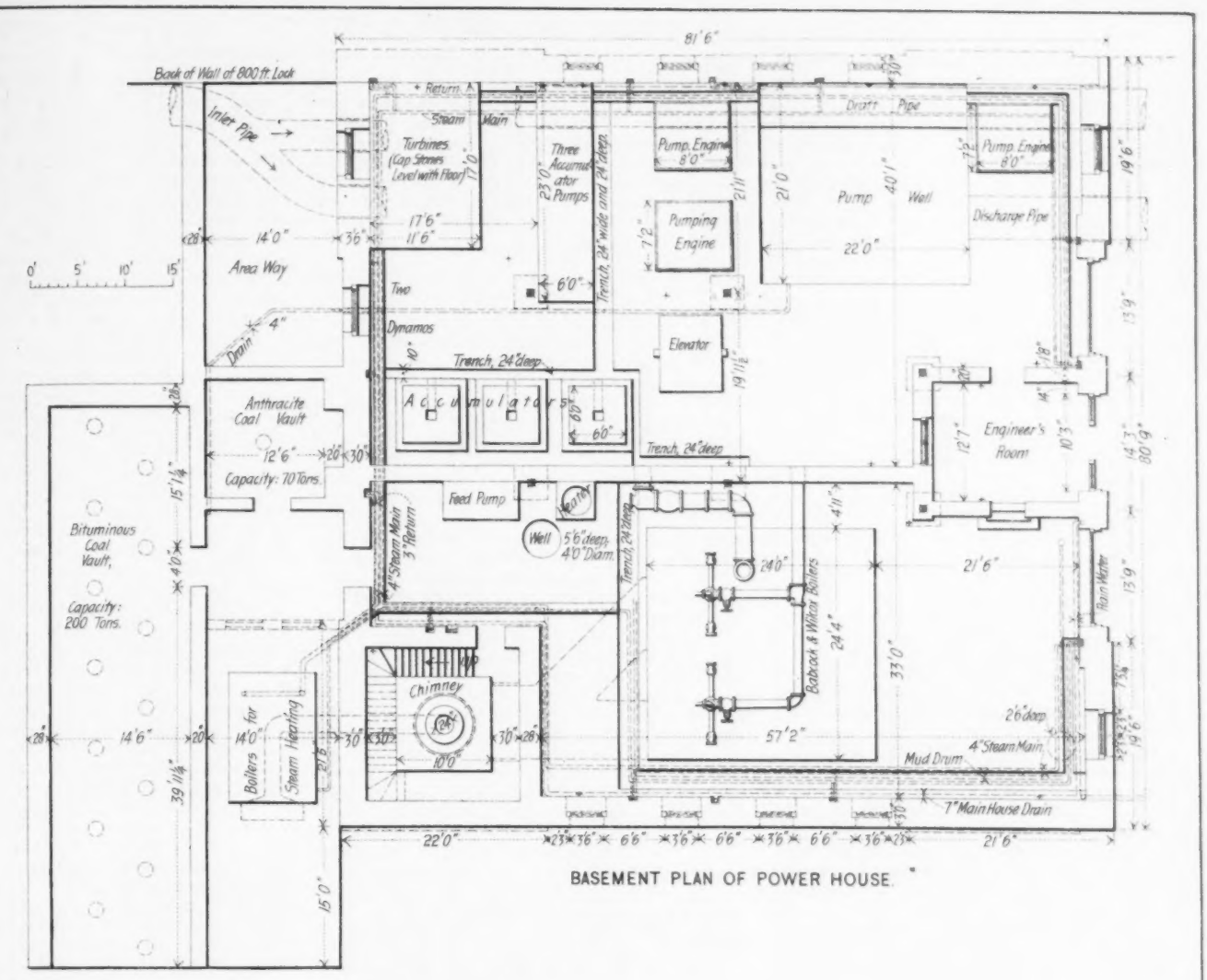
EAST ELEVATION OF POWER HOUSE.



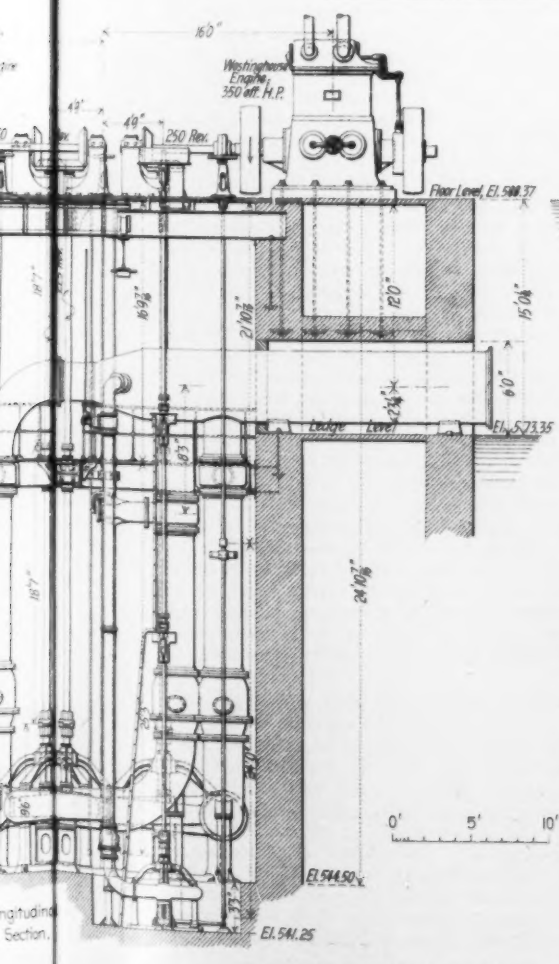
Longitudinal Section.

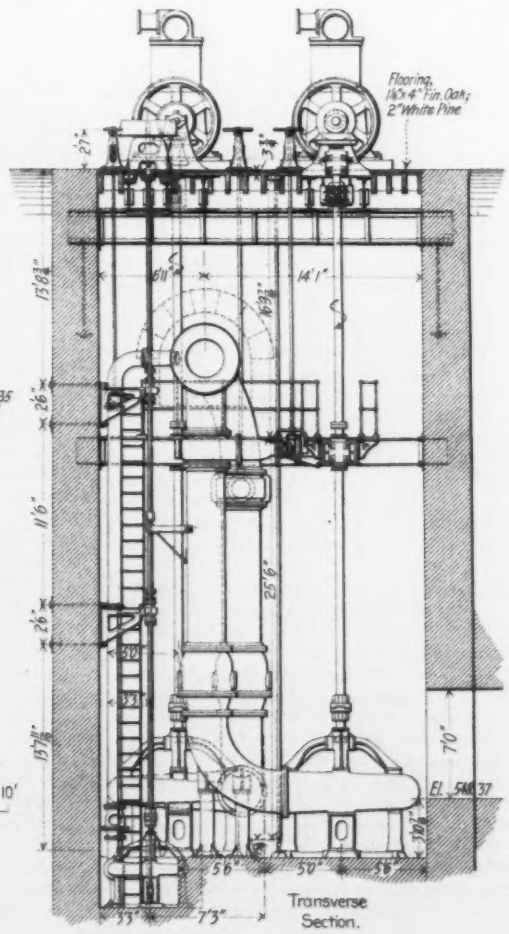


HORIZONTAL SECTION
H PUMP WELL NEAR BOTTON.



BASEMENT PLAN OF POWER HOUSE.





VERTICAL SECTIONS THROUGH PUMP WELL.

POWER HOUSE AND PUMPING MACHINERY FOR THE UNITED STATES LOCK, SAULT STE. MARIE, MICH.

Col. O. M. Poe,* U. S. Engineer Corps,
Engineer in Charge of
Navigation Improvements
on the Great Lakes.

E. S. Wheeler, U. S. Asst. Engineer
in Charge of Work
on St. Mary's River.

*Died October 2, 1895.

CHAS. HART & BOND, LITH., 26 VESEY ST., N. Y.

place. The age of sails, or of engines as mere auxiliaries to sails, has passed. The modern cruiser or battle-ship is a most complicated machine, depending absolutely for its powers of movement, attack and defence upon the efficient design, construction and operation of very complicated machinery. Engines of many types turn the twin, or triple, screws, handle the heavy guns and their ammunition, and steer, ventilate and light the ship; and without a sufficient number of trained and able men to direct what is really the life of the vessel, a modern warship is an inert, harmless, floating mass of costly materials. To design and to construct this intricate mechanical plant, and to constantly keep it in a state of efficiency, require an education and practical experience, and a degree of care and a sense of personal responsibility more than equal to the demands put upon any class of officers in the navy. The conditions are such that one officer cannot possibly do work which properly belongs to three or four; and to assume that an ordinary ship's mechanic can efficiently fill the place of a trained, highly educated and responsible official, as some old-fashioned line-officers of the navy contend, is an absurdity that would be likely to cost our government untold loss in an emergency. The duties and responsibilities imposed upon the modern engineer officer, and the degree of ability and training required, make him a much more important individual aboard ship than he was some years ago; and if traditions of relative rank stand in the way of a recognition of changed conditions, it is the duty of Congress to sweep out these traditions, along with the wooden hulls, engines and guns of an out-of-date navy. It should be self-evident that it is even more essential to have a sufficient, properly trained and well organized corps of engineers to handle the new ships we have than to add another "Columbia" or "Indiana" to our navy list.

The record-breaking long-distance run of a train on the Lake Shore & Michigan Southern Ry., on Oct. 24, as described in another column, calls attention to the possibility of making a record-breaking run for the whole distance from New York to Chicago. We now have a record of 540 miles in 9½ hours (of which 510 miles were made in eight hours) from Chicago to Buffalo, and 440 miles in less than seven hours from New York to Buffalo. In both cases the trains had carrying capacity for a considerable number of passengers. If we allow 8½ hours for the first 540 miles, and seven hours for the last 440 miles, which figures are somewhat more than those of the two record runs, the average speed would be a little over 63 miles per hour for the 980 miles. The "Exposition Flyer" in 1893 made this run regularly in 20 hours, or at an easy average of only 49 miles per hour, which is far ahead of any record yet made for such a distance. Judging by the two records made on the eastern and western parts of this route, there seems to be no physical reason why the entire trip could not be made in 15½ hours; but whether there would be any financial advantage in a regular service at such speed is open to very serious question. The 20-hour train was a paying investment in 1893, when the Columbian exhibition caused an abnormal amount of through traffic to Chicago, but the fact that it was taken off after the close of the exhibition appears to show that the regular traffic did not warrant keeping the train in service, and, of course, railways do not run regular express trains unless there is some good reason therefor. At the present time the railways have probably more to gain, in a practical way, by considering the question of the acceleration of the speed of suburban trains rather than that of express trains.

In commenting upon an editorial on "The Acceleration of the Speed of Express Trains" (Eng. News, Sept. 19), a correspondent sends us some questions concerning the relative cost of running trains at different rates of speed, as affected by the coal consumption, maintenance of engines and track, etc., but we do not know of any reliable figures bearing on this matter. The engine should, of course, be designed for its particular service, and with such an engine on a suitable track it does not appear as though the cost per mile of engine service or train service would be materially affected by variations of speed within quite wide limits, or by the maintenance of maximum speed for longer or shorter periods of time. In fact, an engine designed for any particular service should show its best performance results when worked up to approximately its normal capacity, as pointed out in the paper on "The Management and Handling of Motive Power" in our issue of Oct. 24.

THE PROPOSED IMPROVEMENT OF THE NEW YORK STATE CANALS.

The people of the state of New York on Nov. 5 are to vote upon the proposition that the sum of $9,000,000 be expended in the improvement of the state canals, the money to be raised by the sale of the state's bonds. The expenditure of this amount has been recommended by the state officials in responsible charge of the canals, and the legislature at its last session passed a law requiring the question to be voted on at the coming election. By the new state constitution all appropriations in excess of $1,000,000 have to be submitted to popular vote; hence it comes about that the question of canal improvement becomes one which the voters themselves must decide.

Whatever may be the merits of the referendum principle where moral questions are involved, it seems exceedingly doubtful whether administrative questions, such as that now submitted, are best decided by a popular vote. The utter incompetence of the average voter to form an intelligent opinion on such a question as the wisdom of expending $9,000,000 for canal improvement is too obvious to require proof. And even the intelligent and educated minority of the voters will, on this question, in most cases, have to cast their ballots with little more understanding than the newly-naturalized citizen, who votes in favor of the proposition because it will "give somebody a job."

Let us consider what some of the elements are which would enter into the consideration of this problem, were it turned over, let us say, to a board of expert civil engineers, with instructions to study it impartially, in all its aspects and render a verdict upon the real merits of the case.

Such a board would first ascertain just what benefits would be accomplished by the proposed expenditure, and what results these benefits would give in reducing the cost of transportation. This total gain in the reduction of cost would then be compared with the interest on the debt incurred, and the question would be weighed whether the direct and indirect benefits to the taxpayers, who will foot the bills, amounted to more than the expenditure incurred. Nor could the inquiry stop here. A broad view must be taken of the whole subject of freight transportation between the Lakes and the seaboard. The probabilities must be weighed of the construction of a ship canal over any of the proposed routes for such a work, and if its construction is found probable, the question of its probable maintenance and continued operation must be considered. The influence of Canada's new 14-ft. route to the sea, now nearly completed, must be measured, and the extent to which further improvements in railway transportation are likely to reduce railway freight rates must be examined. It might also become necessary to consider the probabilities of the success of electric traction on the canals, and also of the operation of barges suited to both lake and canal traffic, and passing from Lake ports to tidewater without transshipment.

Manifestly neither the average voter nor the man of education is going to precede the casting of his vote by any such laborious inquiry. The question will be actually decided, not upon its merits or demerits as a business proposition, but largely on the lines of local and political prejudices. A large proportion of the residents of the counties along the canal will vote for the measure, because the money is to be spent in their vicinity, and will give employment and chances for profit to several thousand people. In the counties remote from the canal, on the other hand, the voters will see no immediate benefit to them, and the secondary benefits are in many cases too remote for them to distinguish. The tax burden involved in the proposition will therefore control their decision.

But while such considerations as these will doubtless determine the fate of the measure, the question at stake is such an interesting one from an engineering point of view, that some discussion of it in these columns may be of interest to our readers, even though time and space will not permit its exhaustive treatment.

The state of New York is the only one in which the canal still continues to be an important factor in transportation. The canals of Ohio, Pennsylvania, Maryland and other states have for the most part been abandoned, or traffic upon them is a mere trifle compared with what was formerly carried. We often hear it said that this is due to railway influence, and this is indeed true; but instead of being a matter for which the railways should be subjected to public censure, it is really an evidence of the superiority of the American railway system. In European countries the canals built more than a half century ago still handle a large proportion of the traffic; but American railways handle freight at so much less cost than is the case in any other country in the world that under ordinary circumstances traffic can be handled on the railways at less cost than on the canals.

The Erie, Champlain and Oswego canals, in New York, however, form links in a great system of waterways, and the Erie Canal especially lies directly in the path of what is probably the greatest volume of freight traffic that the world has ever known. Thus, while canals in other parts of the United States have been in large measure abandoned, the New York canals still remain in active operation.

The Erie Canal is 352 miles in length. It was built with a surface width of 70 ft., a bottom width of 56 ft., and a depth of 7 ft. The locks were 110 ft. long, 18 ft. wide and 7 ft. deep on the miter sills. For many years the levels have been filling up by the accumulation of sediment and the growth of vegetation, until 6 ft. is the limit of draft of a laden boat upon many of the levels, as well as over the miter sills of the locks. With this draft 240 tons is the limit of lading of the boats.

The first and most important of the improvements which it is proposed to make is to increase the depth of the canal to 9 ft. on all levels by cleaning out the bottom and excavating it 1 ft. below its original depth, and by raising the banks 1 ft. in height. At all fixed structures, such as locks, aqueducts, etc., the depth will be increased, so that boats drawing 8 ft. can pass in safety. With 1 ft. of water under the keel, it is expected that much better time can be made on the levels than at present.

In the present locks the miter sill projects about 1 ft. above the floor of the lock. It is proposed to remove these miter sills entirely, remove the cumbrous old wooden gates, cut vertical grooves in the lock walls and build steel lift gates to slide up and down in these vertical grooves. Such gates would permit an increase of 10 ft. in length in the boats using the canal, and would, it is believed, be much more durable and more quickly operated than the old-style gates now in use. The present 7-ft. aqueducts will, it is claimed, permit the necessary deepening to give a draft of 8 ft. over their whole length.

Practically a gain of 1½ to 2 ft. in draft would be thus secured for laden boats, and this would permit a boat which now carries 240 tons to carry 75 to 100 tons more. But with 2 ft. more draft available and the locks lengthened 10 ft., boats could be built with greater length than at present, and probably some 400 tons could be safely counted on as their capacity.

The second great improvement which it is proposed to make is to increase the length of the locks and build three locks of high lift, such as that illustrated in our issue of April 18, 1895. Of the 72 locks between Buffalo and Albany, 40 have already been lengthened to 241 ft., the work having been in progress for several years. On the Erie Canal boats are now practically always towed in pairs, and the lengthened locks will admit the boats without the delay to unfasten them from each other and haul them into the lock separately, which is necessary at locks of the old length.

Of the remaining 32 locks, it is proposed to substitute single locks of high lift for the groups of

16 locks at Cohoes, the five locks at Lockport, and Locks 20 and 21, near Schenectady. This will leave on the main line of the canal only four locks at Little Falls and three at Newark still of the old length, and the difficulty and expense involved in remodeling these on any plan is so great that it is proposed to leave them alone for the present.

With the high-lift locks proposed, it is believed that sufficient time will be saved in the passage of the locks to enable the boats with the heavier loading contemplated to make the same time from terminus to terminus as at present. These locks will also greatly economize in the use of water for lockages, a question which would become of great importance should the improvement of the canal materially increase the traffic upon it.

The annual operating expenses of the New York state canals now amount to about $742,000. State Engineer Adams estimates that the substitution of lift gates at all the locks and the high-lift locks for the groups of locks, as outlined above, would effect an annual saving of $55,000 in operating expenses.

How much will the deeper waterway and lock improvements reduce the cost of canal transportation is the next question, and to answer it properly a study of the cost at present is necessary. During the 10 years from 1872 to 1881 the average freight rate from Buffalo to New York by canal was 8.1 cts. per bushel. In 1882 tolls on the canals were abolished, and in the 10 years ending in 1891 the average rate was only 4.3 cts., and dropped as low as 3.37 cts. in 1888. In 1892 it was 3.4 cts.; in 1893, 4.6 cts.; and in 1894, 3.13 cts.

The season just closing, however, has seen canal rates reduced to a figure never before touched. It is stated that during the first part of the season the railways began competition with the canal in a manner never before known, and up to July 1 of the present year the average canal rate on wheat from Buffalo to New York was only 1.75 cts. per bushel. From all the information at hand, it appears certain that this figure represents less than the actual cost of carriage with the canals in their present condition, if a suitable return is allowed to the boat owners upon their investment. Horse-propelled boats have been practically driven out of the business during the past season. Only the owners of steamers could keep at work at such rates, and even these complain that they have made no profits this year, although rates have been higher during the latter part of the season.

Mr. Thos. C. Clarke, in his valuable paper published in our issue of Oct. 10, estimated that on the present Erie Canal one tug towing three wooden canal boats of the present type can carry grain at a minimum rate of 2⅓ cts. per bushel from Buffalo to New York. This seems to correspond fairly well with the figures deduced from the phenomenally low rates of the present year. Previous schemes for Erie Canal improvement have claimed nothing lower than an average rate of 2 cts. per bushel as the ultimate minimum, as a rule; but this year has shown that 2⅓ to 2½ cts. will certainly cover the cost under the present conditions.

If, then, a canalman running a steam tug and consort can now carry wheat for 2½ cts. per bushel, it is manifest that with an improved Erie Canal, which will enable him to load his old boats more deeply or to run new boats of some 40 to 50 per cent. greater capacity, the rate at which he can afford to carry grain will be reduced about in proportion with the increased capacity of the boats, for the expense of running the larger boats will be very little greater than at present.

Let us assume that the reduction in cost of carriage on the canals by the proposed $9,000,000 improvements will amount to 1 ct. per bushel, or 33⅓ cts. per ton. In 1894 the Erie Canal carried 3,144,144 tons of freight. Hence at this rate $1,048,048 would be saved in freight by the proposed canal improvements, or an income of over 11 per cent. on their cost. But the tonnage of the canals in 1894 was the least it had been since 1859. In 1880 the tonnage of all the New York state canals was 6,547,656, or more than double what it was in 1894. The railways have been taking, year by year, a larger share of the business. In 1893 106,830,450 bushels of grain were received at New York, of which 43,835,800 bushels came by canal and 61,803,000 bushels by rail. That all this traffic, or probably even the greater part of it, can be regained by the canals cannot be expected; but it should be certainly possible, when grain can be carried from Buffalo to New York for 1½ cts. per bushel, to increase canal traffic to the point it reached 14 years ago.

The argument has been brought forward that the proposed expenditure of $9,000,000 upon the canals should not be made, because a ship canal from the Great Lakes to the ocean would make such an expenditure useless. We discussed the commercial and engineering probabilities in connection with ship-canal schemes over this route in our issue of Oct. 10, and need not now repeat the conclusions then reached. The single fact may be pointed out however, that a canal rate of 1½ cts. per bushel from Buffalo to New York amounts to only 1-10 ct. per ton per mile. Remembering that freight rates on the open ocean on the lines of heaviest traffic and lowest rates are often as much as this, and seldom less than half of this, it ought to be easy to see that even were a free ship canal open to the Great Lakes, it by no means follows that ocean vessels could afford to use it in competition with cheaply-built barges on the Erie Canal.

The question of railway competition, present and prospective, appears to be more important in connection with the Erie Canal's future than the possibilities of a ship canal. Evidently if the Erie Canal is left in its present condition, its decadence from this time onward seems assured. For a score of years the amount of bulk freights carried by the railways which compete with the Erie Canal has been advancing by leaps and bounds, while the canal traffic has been falling off. In the past season the railway competition has been felt as never before, as we have set forth above.

During the past season the New York Central & Hudson River R. R., we are informed by Mr. Samuel Goodman, General Freight Traffic Manager, has carried wheat at rates as low as 3 cts. per bushel from Buffalo to New York, or 0.2 ct. per ton-mile. To handle the traffic at this low rate without loss, trains of 40 cars were run, each car holding 1,000 bushels. This would make the receipts from one trip $1,200. Assuming cost of car service at ⅝ ct. per car-mile and locomotive service at 30 cts. per train-mile, we have $275 as the train expenses, aside from trainmen's wages, which, on a through run, would hardly bring the total cost chargeable to the operating department at over $300. But other expenses, for maintenance of way, terminal charges, interest on bonds, taxes, etc., must be considered in estimating the cost of freight carriage by rail; and while we fully believe that the steady reduction in this cost, which has gone on for the past half-century, has by no means reached its end, we also believe that even with the favorable grades of the New York Central, 1½ to 2 cts. per bushel is a lower railway rate than is likely to be permanently maintained from Buffalo to New York for a quarter-century to come.

We can take little space now to discuss the improvements in canal navigation which electric towage may bring, and if it be true that the deepening of the canals and improvements to the locks at the cost named can reduce the cost of canal traffic 1 ct. per bushel, it appears clear that such improvements should be carried out regardless of whether electric towing is likely to be a success or a failure. That the experiments with electric towing now in progress are tending in the right direction appears to be entirely clear, and we see no reason why the system may not be made an entire success from an engineering point of view. Whether electric equipment can be made simple and cheap enough to enable it to compete with steam towing on the canal is another matter on which no opinion not based on a detailed examination would be of much value.

We can only allude, likewise, to the promising proposition to build barges suitable for both lake and canal traffic, and tow from lake ports to tide-water without breaking bulk. It is manifest, however, that such a scheme possesses many attractive features, and will be much more likely of success with the Erie Canal deepened and improved than in its present condition. The able engineer who has been recently nominated for the presidency of the American Society of Civil Engineers has estimated that with the Erie Canal deepened as proposed, grain could be carried from Chicago to New York without breaking bulk at a cost of 2 cts. a bushel. If this estimate is well founded, there should be no possible doubt as to the wisdom of carrying out the projected great improvement of the New York state canals.

LETTERS TO THE EDITOR.

WHAT IS THE ELASTIC LIMIT OF CEMENT?

Sir: Can you give me any information concerning the elastic limit of cement? This property is not well defined in this material, and is not usually observed in tests. If you have knowledge of any tests of cement in which the elastic limit has been observed, kindly inform me where records of the same may be found, and, if convenient, give the values of the elastic limit as compared with the ultimate strength,

Benj. F. La Rue.

Scranton, Pa., Oct. 21, 1895.

(We submit the query to our readers.—Ed.)

THE COATING OF THE STEEL CONDUIT FOR THE ALLEGHENY WATER-WORKS—CORRECTION.

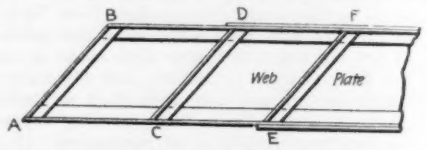
Sir: The article on the Allegheny conduit, in Engineering News of Oct. 10, states that the joints were coated with California asphalt. This is only partially correct. The California asphalt was used for coating the field joints, on the outside of the pipe, and for the abrasions on the upper side of the pipe, while Edward Smith & Co.'s black bridge paint was used for coating the field joints on the inside of the pipe, and for all abrasions in the interior of the pipe, and the under side of the exterior of the pipe.

Yours respectfully, Robt. Swan,
Engineer, Allegheny Water-Works.

Allegheny, Pa., Oct. 15, 1895.

STIFFENERS FOR PLATE-GIRDER WEBS.

Sir: In a plate-girder with stiffeners, the compression and tension strains occur in different directions and positions. If the strains, on account of the rigidity, provided by stiffeners A B, C D, E F, are compression along these lines, then from B to C, or B to



E, there must be tension strains. The latter strains do not require any stiffening of the web-plate. It is therefore preferable to omit stiffeners B C or B E and to add rather a stiffener such as C D between. Although this has not been carried out, to my knowledge, I think this suggestion is as noteworthy as other designs published with respect to this question.

Very respectfully, Chas. Steiner.

116 Catherine St., Elmira, N. Y., July 19, 1895.

THE BACKFILLING OF TRENCHES.

Sir: Noting the interest attracted to the backfilling of trenches, as shown by your issues of Aug. 22, Sept. 5 and Oct. 17, I beg to call the attention of those of your readers to whom it may be of use to my experience in backfilling for the New York Department of Docks on their marginal street in New York city, which has met with success.

As much as is possible of the solid material excavated from the trench is replaced in layers of about 6 ins., each layer being rammed thoroughly, to enable the pavement to be relaid on a bed of 3 ins. of sand with gravel and asphalt joints, the same as before being disturbed, but at a grade about ½ in. higher than the adjoining pavement. I have never been able to replace the entire amount excavated, as the marginal street is made land, in which there is a considerable amount of brick and stone. The high grade in a few months disappears, owing to the traffic, and the line of the trench is imperceptible. These trenches have been from 3 to 6 ft. wide, 200 ft. long, and from 4 to 6 ft. deep. The pipes for which the excavations were made varied from 2 to 6 ins. in diameter.

The only failure I have had was in winter, when the backfilling was frozen and contained a certain amount of moisture. A settlement of about 2 ins. occurred the following summer. Since then I have replaced the pavement temporarily when obliged to backfill in a freezing temperature and waited until spring for the permanent paving of the trench.

Yours truly, Eugene Lentilhon.
Assoc. M. Am. Soc. C. E.

Engineer's Office, Department of Docks, foot of Chambers St., New York city, Oct. 19, 1895.

JOHNSON'S FORMULA FOR SHORT COLUMNS.

Sir: Referring to Mr. Henry S. Prichard's communication in your issue of Sept. 26, on my proposed formula for short columns, which you first published in your issue of Aug. 1, 1895, I think it becomes necessary now to prove what I have hitherto simply stated to be a fact.

The formula itself is

$$A = \frac{1}{p}(P + 3\,k\,P_e),$$

where A = area of column section required.
p = working maximum stress on the outer fibers.
P = total concentric load.
P_e = total eccentric load.
k = eccentricity of the eccentric load in terms of the half-width of the column $= \frac{v}{y_1}$.

This being a very simple formula, and "theoretically correct for architects' use," as I undertook to show in my first communication, it seems important to establish its claims. Having answered certain objections to it in your issue of Aug. 29, I will here address myself only to Mr. Pritchard's criticism, that it is not proper to consider eccentric loads as concentric after passing one floor. I stated in my first communication that this was customary, which I supposed was the case until Mr. Prichard questions it. I can only say if it is not customary, it ought to be, and I offer the following as the proof of the proposition.

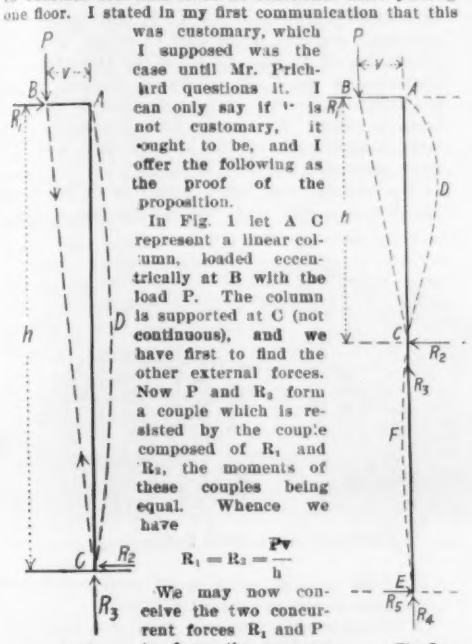


Fig. 1. Fig. 2.

In Fig. 1 let A C represent a linear column, loaded eccentrically at B with the load P. The column is supported at C (not continuous), and we have first to find the other external forces. Now P and R_3 form a couple which is resisted by the couple composed of R_1 and R_2, the moments of these couples being equal. Whence we have

$$R_1 = R_2 = \frac{Pv}{h}$$

We may now conceive the two concurrent forces R_1 and P to form the one resultant force acting on the line B C, which is resisted by the resultant R_2 and R_3 acting along the same line. These are the four primary, or the two resultant forces which the column has to resist. As the line of action of this resultant lies outside the axis of the column, it will be subjected to bending moment, equal at the upper end to Pv, but which reduces to zero at C. The column will bend into the position A D C, but there will be no bending action transmitted below C. The reactions R_1 and R_3 are supplied by the floor connections, since this action does not involve rigidity of direction in such connections, but only rigidity of position.

In Fig. 2 the column is supposed to be continuous at C. The effect of this is to transmit some bending action below C, but in the opposite direction. This is a vanishing effect, and soon practically disappears, as does the effect of loading one span of a continuous girder of many spans. Thus the bending moment on the part of the column from C to E is due to the reaction R_5. As this would be very small, and as these reactions rapidly diminish at the succeeding floors, we can well afford to neglect these secondary moments, even in continuous columns. Any small failure of absolute continuity would tend to prevent this action below the first floor. I believe no jointed column, as used in architectural work, is ever made sufficiently continuous in its construction to warrant our treating it as such.

J. B. Johnson.

SAN JUAN DAMS AND THE NICARAGUA CANAL.

Sir: In your issue of Oct. 10 Mr. Ford asks: "Is it, or is it not, possible to dam the San Juan River at any point below Ochoa?"

I can answer this question. It is not, except by low dams. When I was in charge of the canal surveys in Nicaragua I investigated this question thoroughly. Col. Childs, who was the Chief Engineer of the Vanderbilt Co., in his report, recommended a dam at the hill near the mouth of the Sarapiqui. I accordingly sent a large survey party there to explore thoroughly for connecting hills or flanking ridges, but they could not find any, and reported the hill to be surrounded by an apparently interminable swamp.

The spurs of the Cordilleras come down to the San Juan on the left side of the river at Tamborcita Island, and at San Francisco Island, and I caused the same explorations to be made on the right-hand side of the river, opposite these places, in the hope of finding high ridges or hills for dam abutments, but was disappointed. Nothing was found but isolated hills and swamp.

Mr. Ford was in the employ of the canal company, and cannot be unaware that this subject was thoroughly discussed by the Advisory Board of Engineers, appointed by Mr. Monocal, consisting of Lieut. Peary, Mr. Davis and myself, at the time the Upper Route was decided on.

Mr. Ford must know that a lower route was surveyed by the parties under Lieut. Peary, which followed the San Juan River and contained several low dams, and such a route was recommended by Commander Luce in Sen. Ex. Doc. No. 57, 43d Cong., 1st Sess. But on mature deliberation the Advisory Board of Engineers recommended the Upper Route, and, I think, wisely. The San Juan Valley has been thoroughly explored, and Mr. Ford must look elsewhere for his line.

There are many other large rivers in . caragua, flowing into the Caribbean Sea, and it seems strange that none of these have been examined in the search for an inter-oceanic canal.

J. Francis LeBaron,
M. Am. Soc. C. E.

Jacksonville, Fla., Oct. 20, 1895.

A CEMENT TESTING MACHINE AND CONCRETE MIXING PLANT.

Work on the improvement of the Coosa River, between Wetumpka, Ala., and the East Tennessee,

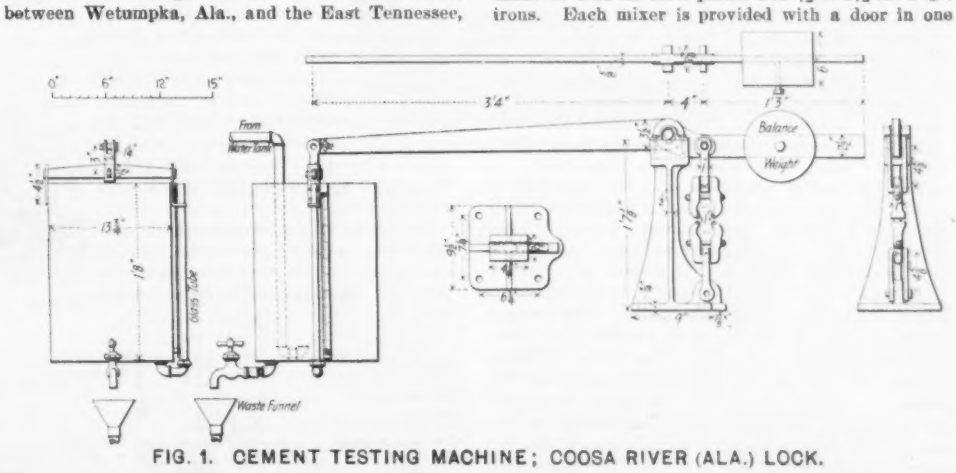


FIG. 1. CEMENT TESTING MACHINE; COOSA RIVER (ALA.) LOCK.

Virginia & Georgia R. R. bridge during the year ending June, 1894, was confined mainly to the site of Lock No. 31, the construction of which lock involves a large amount of concrete work. A cement testing machine, for the rapid and accurate testing of cement briquettes, was designed by Mr. Charles Firth, U. S. Assistant Engineer, under the late Capt. Philip M. Price, U. S. Engineer Corps. The special feature of this machine, which is shown in Fig. 1, consists in the use of water instead of shot for applying the load. From the free end of the lever is suspended a circular tank, with a glass gage tube at the side, and a scale graduated to show the load in pounds at any elevation of the water. A supply pipe from a fixed tank is led down to near the bottom of the vessel when in its upper (or empty) position, an elbow on the mouth of the pipe preventing any shock from the stream of water, the flow being upward, so that as soon as the mouth of the elbow is submerged, the water level rises evenly and steadily. The weight is applied by the water at the rate of 400 lbs. per minute. The water in the tank is kept at a constant head, and is, of course, admitted slowly to the vessel, being shut off the moment the briquette breaks. The advantages claimed for the machine are simplicity, regularity in applying the strain and absence of jar or shaking. The briquettes are of neat cement, and also of 1 part cement to 3 parts of sand, with an area of 1 sq. in. at the smallest section.

The concrete mixing plant is shown in section in Fig. 2. The top floor is a cement storage room, with capacity for 2,000 barrels, and on the next floor below are tracks for the side-dump cars carrying sand and stone, the hoppers being directly under the chutes of the cement hoppers. Underneath again are the mixers, and as the materials enter the mixers water is added, the quantity being controlled by

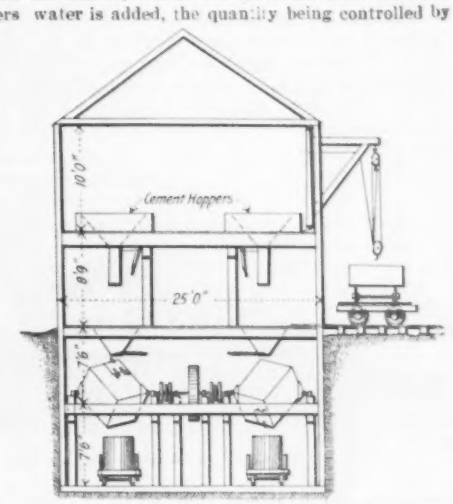


Fig. 2. Cross Section of Concrete Mixing Plant; Coosa River (Ala.) Lock.

valves on the mixing floor, the operator being governed by indicators which show the quantity used. The mixers are cubical boxes, 4 × 4 × 4 ft. inside, made of 5-16-in. steel plates and ½ × 2½-in. angle irons. Each mixer is provided with a door in one corner 22 ins. square, fastened with a tempered spring steel catch, and held open when required by a hinged screw bolt. The shaft which revolves the mixers is 3 ins. square, and securely fastened to the mixers by trunnion castings at diagonally opposite corners. The plant is driven by a horizontal engine, with cylinder 10 × 16 ins., being thrown in and out of gear by ordinary friction gearing with friction and brake levers. After a sufficient number of revolutions in the mixers, the concrete is dropped into center dump cars on the tracks on the bottom floor of the building.

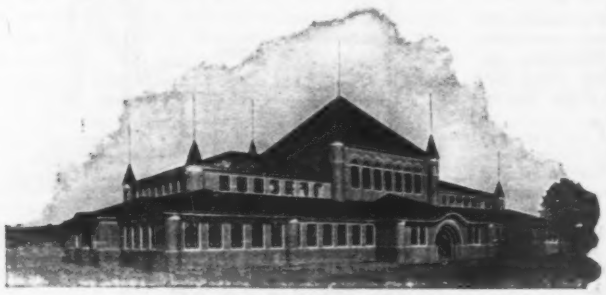
The average output is about 200 cu. yds. of concrete, rammed in place, per day of eight hours. This, however, is limited more by the facilities for distributing and depositing than by the capacity of the plant.

The manufacture of tin-plate in the United States has increased 39% in the last fiscal year, says Special Treasury Agent Ayer in his report for the year ending June 30, 1895. During this year the production of commercial tin and terne plate was 193,801,073 lbs., against 139,223,467 lbs. in the preceding year. Of this production 83% were made from sheets rolled in the United States. In all 52 American firms were producing commercial tin and terne plates, and 29 firms were producing black plates. The total imports during the year ending June 30, 1895, were 518,968,401 lbs. and the total exports were 126,777,800 lbs., showing net imports of 387,185,601 lbs. The approximate domestic consumption in the United States is 580,968,674 lbs. annually. The average annual capacity of American mills, completed and under construction, is about 570,000,000 lbs.

THE ATLANTA EXPOSITION.

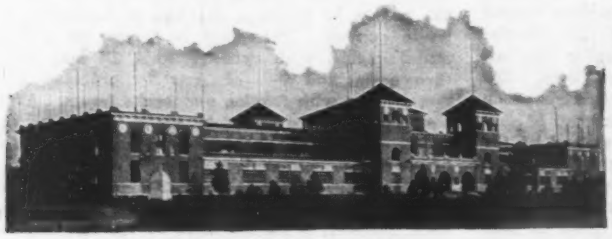
(Editorial Correspondence.)

The Atlanta Exposition has one feature of superiority to the Chicago Exposition in the mind of a Northerner, who can spend only a few days visiting it—that is, it can be comfortably seen in about three days, while the Chicago fair was so overwhelmingly vast that three weeks would not suffice to give a proper view of the exhibits in the buildings, while the attractions outside of the buildings were so great that a study of the exhibits themselves became a labor rather than a pleasure. The Atlanta Exposition is unquestionably a grand success. As a mere show of beauty and novelty, of course it cannot be compared with the Chicago and Philadelphia world's fairs, but as an exposition of the resources and industries of the Southern states it has an educational value to the Northerner as well as to the Southerner, and to the latter it should prove as valuable an eye-opener to what is being done in the art and industry of the world as the Philadelphia exhibition was in 1876 to the resident of the North and East, and the Chicago exhibition to the Westerner.



TRANSPORTATION BUILDING.

The Centennial exhibition was the beginning of a new era in education and in industrial art in the United States. Our present system of manual training in education dates from the exhibit of the Russian technological school at Philadelphia, and artistic household decoration received its first great impetus at that exhibition. The Chicago exhibition was the beginning of a new era in American architecture, and a revelation of the hitherto undreamed-of capacity of American architects. The return to classic ideals and the escape from the barbarism of the hotch-potch architecture of the years 1860-90, accomplished in that exposition, will have an immense influence on the American architecture of the future. What new era will be introduced by the Atlanta Exposition? Manual training, industrial art, good architecture and good landscape work are all there, but they are not new. There is nothing in the engineering line especially noteworthy. The one thing for which the exposition is valuable to the Northern visitor is that it is an exposition of the natural and industrial resources of the South, and a marvelous illustration of what can be done by the enterprise of a Southern city of but little over 100,000 inhabitants. To the Northerner the exhibition is a school containing a multitude of object-lessons concerning the South, its people, its resources and its possibilities. To the Southerner it is what the Philadelphia and Chicago exhibitions were to the Northerner; it is a school in which he can learn something of industry, something of art, something of educational methods, and much, thanks to the government exhibits, of what the government is doing for the whole people. The Southern people may have their eyes opened to the fact that they are as yet far behind the North, and behind civilized Europe, in machinery and its application, in correct systems of agriculture, in education, in literature and in art, but they and the Northern visitors also will learn that there is in the natural resources of the South, in its soil, its climate, its mines and forests, and in the laws by which it is governed in common with the rest of the country, the possibility and the promise of a future in population, in industry, in wealth, in art, and in all the refinements of civilized life equal to anything that the world has ever seen. This is the chief use of the Atlanta exposition, and its chief result, if we mistake not, will be the attraction of the attention of the rest of the country to the South, and an impetus to immigration and to investment of capital such as has never before been felt.



MACHINERY BUILDING.

With this introduction, a few notes may now be given of what your correspondent saw or learned during his three days' visit. The exposition is located in Piedmont Park, containing 189 acres, about three miles from the business center of the city. The general scheme of the layout of the grounds comprehends the grouping of the buildings on a ridge running around a lake, so as to produce an amphitheatre effect. The lake is about 2,000 ft. in length, of an average width of 300 ft., and is divided into two parts, or arms, which lie at an angle of about 120° with each other. Between the lake and the circle of buildings the grounds are laid out as a park. The arrangement is excellent, both for convenience and appearance, and at night, when the whole is brilliantly illuminated by electric lights, it is very beautiful.

Beginning at the main entrance, and proceeding around the circle towards the right, the following is a list of the principal buildings with their dimensions:

Building.	Size.
Administration	240 × 50 ft. three stories.
Agricultural	304 × 150 " 110 ft. high.
Mines and Forestry	350 × 110 " 50 " " in center.
Machinery	500 × 118 " 60 " "
Negro	276 × 110 " 70 " "
Georgia Manuf'r's	254 × 84 "
Transportation	450 × 150 " 68 ft. high.
Electricity	262 × 85 " 109 " to c. of dome.
Woman's	150 × 128 "
Manf'r's and Lib. Arts	356 × 206 " 90 ft. high.
U. S. Government	260 × 180 "
" " " Annex	140 × 80 "
Fine Arts	245 × 100 " 50 ft. high.
Fire	205 × 50 " two stories.

Besides the above there are a number of smaller buildings, including the Georgia, Alabama, California, Massachusetts, New York, Pennsylvania and Illinois state buildings, the Auditorium and the Southern Ry. and Plant Railway System buildings. There is also Midway Heights, an imitation on a moderate scale of the famous Midway Plaisance at Chicago. The buildings are in general substantial but cheap constructions of wood, shingles and glass, without colonnades or galleries, and, according to the advertisements, architectural effect is produced by proportion and outline rather than by detail and tawdry ornamentation. The color of the buildings is generally gray, with white trimmings and moss-green roofs. The landscape effects are produced by a park, with grass and evergreen shrubs, slopes and terraces covered with running honeysuckle, walks of crushed limestone and rustic rockwork instead of masonry. Ornamental effects are given by fountains, statues, vases and electric lights. More than $800,000 has been spent upon the landscape, and over $2,000,000 in all to make the fair. Of this total $250,000 was raised by private subscriptions of the people of Atlanta, $75,000 was appropriated by the city council, $75,000 by the county, $50,000 by the railways and $250,000 by the U. S. Government. A few notes may now be appended concerning some of the exhibits.

The display in the Agricultural Building consisted chiefly of the products of the soil of the several Southern states. Grasses, grains, fruits and food products in general were present in great variety, together with cotton and tobacco, the products upon which the wealth of the South has hitherto chiefly depended. Agricultural machinery seems to have been crowded out from this building and put in the Transportation Building. There is no exhibit of live stock. State exhibits from Arkansas, Florida and South Carolina are included in the Agricultural Building, while Georgia's exhibit is in the State Building.

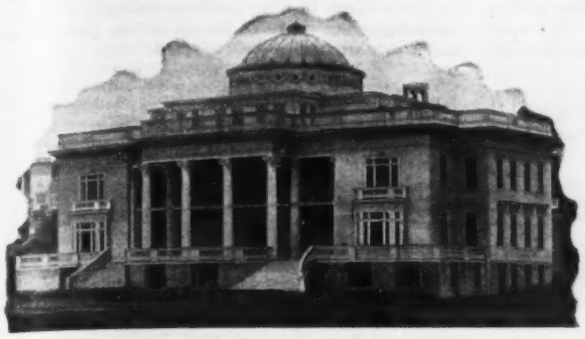
The Mines and Forestry Building has one of the most complete exhibits in the whole exposition, and as representing Southern resources of the mine and forest, it is superior to the exhibit at Chicago. One-half of the building is devoted to forestry, and is in charge of Mr. B. E. Fernow, the Chief of the Bureau of Forestry of the U. S. Agricultural Department, and the other half to mines, in charge of Mr. David T. Day, Chief of the Department of Statistics of the U. S. Geological Survey. These gentlemen have vied with each other in their efforts to make their respective departments the most complete of any in the exhibition, and they have succeeded not only in making the best show of the mineral and forest resources of the South that has ever been seen, but in arranging it so that it is of the greatest value to the student and most interesting to the non-expert visitor.

AGRICULTURAL BUILDING.

In the mineral department there is a monument made by blocks piled one above another, representing the volume of each of the minerals produced in the Southern states for each minute in the year. At the base is a cube of coal 11 ft. on each side, representing the coal mined per minute in the entire South, with divisions showing the product of West Virginia, Alabama, Maryland, Kentucky, Tennessee, Indian Territory, Virginia, Arkansas, Texas, Georgia and North Carolina, in the order named, the first state having the largest production. Above the coal are wooden blocks, representing in order the bulk produced per minute of iron ores, petroleum, limestone, phosphate rock, granite, cement, sandstone, marble, pyrites, slate, mineral waters, soapstone, gypsum, barytes, baxite, mineral paints, copper, zinc and other metals. Geological and other maps, sections, etc., are exhibited, showing the locations and extent of the deposits from which these several substances are obtained, and numerous samples of each are shown. One of the interesting features of this building is the exhibit of terra cotta in various forms by the Atlanta Terra Cotta Co. and the Southern Terra Cotta Works. Both concerns show fine sculptured work, the latter an excellent statue of Victory, by Pellegrini. This is executed in staff, composed of calcined gypsum, clay and tow.

Plaster Bas-Relief on Transportation Building.

The forestry exhibit contains not only numerous samples of the various woods of the South in all forms, including polished surfaces, showing the grain, but an excellent scientific exhibit by the Forestry Bureau of the characteristics of each of



WOMAN'S BUILDING.

the woods. A compartment in a glass case is devoted to each, showing samples of the bark, leaf and wood cut in different directions to show the different graining, and charts and tables giving geographical distribution, strength and other qualities, microscopic structure, etc. An interesting study might be made here of the different varieties of pine, and the different names by which they are known. For instance, "Georgia pine" is not one kind of pine, but several kinds. The term "yellow pine" also includes several distinct varieties, while "long-leaf pine" is the correct name of the best variety of yellow pine. This variety grows in several states, and is called by more than 20 different names throughout the country. One of the surprises of the exhibit is the fact that this long-leaf pine, generally supposed to be chiefly useful where strength and durability are required, is, when curly grain is found in a tree, one of the most beautiful of all woods. Handsome polished tables and other furniture made of this curly yellow pine are shown in the exhibit. Probably the most instructive of all the object-lessons in the forestry building, if not in the whole fair, is a topographical model in triplicate sections, each about 4 ft. square, rep-

ELECTRICITY BUILDING.

resenting the same piece of rolling farm land in three conditions. The first is labeled "How the Farm is Lost," and is a representation of what has occurred in thousands of places throughout the South—the total destruction of the value of the farm by erosion, by storms and other causes. The next is "How the Farm is Recuperated," showing how such a piece of land can again be made good farm land; and the third is "How the Farm is Retained," showing how, by proper precautions, the destruction of the farm may be prevented. The legends attached to these three models are as follows. They should be carefully studied by every one who has any interest in the preservation of the agricultural land of the country:

How the Farm is Lost.

Clearing of hilltops, or excessive cutting of wooded hillsides, followed by burning of litter, underbrush and young growth, and by the tramping of cattle, which compacts the soil, induces rapid surface drainage, which leads to erosion, gullying and washing of the soil.

By the unimpeded action of surface waters rushing over bare slopes and compacted soils, the fields and hillsides are gullied, meadows covered with sand and debris, the fertility of the soil itself is washed out, and carried away in brooks and rivers.

How the Farm is Recuperated.

Erosion, gullying and washing are arrested by keeping hilltops and steep hillsides under forest, by changing surface drainage into underground drainage, checking the downrush of waters by means of brush and stone dams, terracing, counter-plowing, ditching, restoring organic matter to the soil by green manuring and mulching, and cultivating thoroughly; also by sodding and sowing grass seed on gentler slopes.

The rush of water must be checked by dense forest growth at the tops and steepest hillsides, where it acquires its momentum. The gullies there must be barricaded with brush dams and stoneworks, the slopes must be changed into terraces, the draws filled up with brush, which the action of the water will cover up with soil. The soil must be treated so as to permit the water to penetrate and flow off underground.

How the Farm is Retained.

On the ideal farm, woodland, pasture and plow land in proper proportion are properly located, according to the nature of the soil and lay of the land. There is no waste land. Every foot of land is used for what it is most fit. Roads are properly located, following the easiest grades; cattle are fenced into the pasture, not out of the fields.

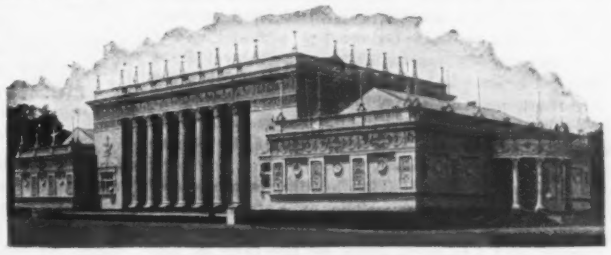
Keep all hilltops, steep hillsides and rocky places under forest. Keep a fringe of wood along the riverside, and belts of trees across the hills on long slopes. Cut your wood systematically and judiciously, so that it will reproduce. Replace where natural reproduction has failed, or is impossible. Let your pasture be where the slope is gentle, and the soil too thin for field crops. Repair all damage by water at once.

Machinery Hall.—The machinery exhibit is a very fair one, but most of the exhibits are by Northern firms. The South is not as yet noted for any extensive production of engines and machinery although the time would seem to be ripe for the establishment of a few first-class concerns to supply the local demand in this line. The boiler plant consists of eight water-tube boilers, built by the Stirling Boiler Co., of Chicago. Coal is used for fuel, fired by hand. No automatic stokers are exhibited. The steam pressure carried is 125 lbs. The chief installation of pumps is by Henry R. Worthington, of New York. It includes an example of the high-duty pumping engine, with a number of smaller pumps. Pumps are also shown by the Knowles Pump Works, of New York, and J. H. McGowan & Co., of Cincinnati.

Power is supplied to the shafting of Machinery Hall by a Corliss single-cylinder engine, built by Frick & Co., of Waynesboro, Pa. It has a cylinder 20 × 48 ins., runs 70 revolutions per minute, and develops 250 HP. at quarter cut-off. The flywheel is 16 ft. diameter, and contains eight grooves for rope driving. Two ropes are used, each taking four grooves, which transmit the power of two jackshafts located under the floor, which, in turn, drive by belting the main shafts in the two sides of the building. Frick & Co. also exhibit a single-cylinder center-crank automatic engine, 14 × 18 ins., 175 HP., at 240 revolutions per minute. There are, in addition to this engine, the following engine exhibits:

Two Westinghouse compound engines, 200 HP. each, driving alternating current dynamos, direct connected. The exciters for these dynamos are driven by two 25-HP. Westinghouse engines. The Harrisburg Foundry & Machine Co. shows an "Ideal" tandem compound engine, with cylinders 14 and 24 × 16 ins., belted to a Fort Wayne alternator. Lane & Bodley (Cincinnati) have a Corliss single-cylinder engine, 22 × 48 ins., developing 400 HP. at 80 revolutions, 18-ft. flywheel; also a vertical compound engine, throttling governor, 10 and 16 × 12 ins., 275 revolutions, 90 HP. The Weston Engine Co., Painted Post, N. Y., has a single-cylinder, 13 × 13-in., double-crank, automatic engine running at 300 revolutions and driving by belt a Thomson-Houston alternator. Houston, Stanwood & Gamble, Cincinnati, show a cross compound throttling engine of 150 HP. The Buckeye Engine Co., Salem, O., has a cross compound condensing engine, 14½ and 28½ × 24 ins. It runs at 160 revolutions, develops 300 HP., and drives through a belt and jackshaft a 160-K-W. Jenney direct-current 500-volt dynamo and a 200-K-W. General Electric 200-volt dynamo. The former of these dynamos supplies current to various electric motors used throughout the buildings and grounds, and the latter furnishes current for incandescent lighting. The Ball Engine Co., of Erie, Pa., has an automatic center-crank engine, 13 × 15 ins., running at 300 revolutions; and the Straight Line Engine Co., of Syracuse, a center-crank engine, 15 × 16 ins., developing 150 HP. at 220 revolutions.

A 100-HP. Raymond improved gas engine is shown by the J. I. Case Threshing Machine Co., Racine, Wis. It has four cylinders, each 12 × 12 ins., running 320 revolutions per minute. It drives a 60-K-W. alternator, built by the Standard Electric Co., of Chicago. A further description of this engine will be given at another time. The Buckeye Iron & Brass Works, of Dayton, O., shows a fine working model of a complete plant for grinding and pressing cotton-seed oil. The Mergenthaler Linotype and the Thorne typesetting machines are both in Machinery Hall. Printing presses are exhibited by the Campbell Printing Press Co. and by the Miehle Printing Press & Mfg. Co. One of the



FINE ARTS BUILDING.

latter company's presses is driven by an electric motor, which is placed in the position formerly occupied by the driving pulley. A pin-making machine is exhibited by the New England Pin Co., of Winsted, Conn., which makes 160 complete pins per minute ready for silvering, out of the wire, which is automatically fed from a coil. Another machine takes the pins and automatically sticks them into a paper strip at the rate of 300 per minute.

A considerable part of Machinery Hall is devoted to a representation of textile manufacture and machinery. Lockwood, Greene & Co., of Boston, mill architects and engineers, show nine handsome pen drawings of as many cotton mills that they have designed for the South, containing from 25,000 to 55,000 spindles each. Cotton gins, delinting machines, spinning and weaving frames, sizing and calendering machines, etc., are shown in great number by several makers. Geo. Draper & Son, Hopedale, Mass., show a remarkable new loom for weaving cotton. It feeds the bobbins for the shuttle automatically from a cage, or hopper, at the side of the loom. As soon as the yarn on a bobbin is exhausted, a latch is thrown automatically, which instantly supplies another bobbin. The cage holds 15 bobbins, enough to last 2¼ hours. It also has an automatic device for stopping the loom if any one of the warp threads breaks. It is claimed that one operative can attend to 16 looms,

MINES AND FORESTRY BUILDING.

and the automatic devices render it a great time, as well as labor, saver. This loom is the most re-

cent important improvement in textile machinery. It has been on the market only a few months.

The machine tool exhibit is rather scant. The Niles Tool Works, of Hamilton, O., is the only concern that makes a good show of iron-working tools. The J. A. Fay & Egan Co., of Cincinnati; the Berlin Machine Works, Beloit, Wis., and the S. A. Woods Machine Co., of Boston, make good displays of woodworking machines.

The Transportation Building is chiefly devoted to bicycles and carriages. The bicycle exhibit is very full and interesting. Railway supplies are shown by a few concerns—such as frogs, switches, etc., by the Ramapo Iron Works; tires, by the Standard Steel Co.; trucks, by the American Steel Foundry Co. and by the Johnson Co. A train shed contains the Pullman train which was shown at Chicago. The Plant railway system has in this shed a day train, with all the latest improvements, consisting of an express car, a combination baggage and smoking car, and two day coaches. These are models of comfort rather than of magnificence, which is the criticism that must be made on the Pullman train. Several locomotives are exhibited of the Rogers, Richmond and Baldwin works. One of the three engines shown by the Baldwin Works, is a Vauclain ten-wheel passenger compound, cylinders 14 and 24 × 24 ins.; drivers,72 ins.; total weight, 131,680 lbs. One of the most interesting exhibits in the Transportation Building is a model, about 20 ft. square, of the great shipyard and dry-dock at Newport News. It is on a sufficient scale to show the arrangement of traveling cranes for conveying and raising the materials to the vessels under construction. A fine topographical map of the Nicaragua Canal is also shown.

The Negro Building.—This building was erected entirely by negro labor. The exhibits represent the handiwork of the negro alone and show the progress that has been made by the race in the 30 years that have elapsed since their escape from slavery. The great variety of the exhibit and the excellent execution shown in many portions will be a surprise to those who have hitherto believed that the negro is not capable of intellectual advancement beyond the point which qualifies him to be a good house servant or ordinary laborer. Among the many products of negro enterprise shown in the building are, products of the farm, it is industrial or manual training work, and is highly creditable.

The Electricity Building.—The show in this building is quite disappointing. There are only 16 electrical exhibits in it. Some space is occupied by articles having no relation to electricity, and a large proportion of the space is left bare. The most complete exhibit is that of the General Electric Co., the central feature of which is an imposing wooden model of the upper field of its largest alternating current generator. It is marked A L-80-800-90, which means, alternating, low inductance, 80 poles, 800 kilowatts, 90 revolutions per minute. It gives what is called a current of 60 cycles—that is, the 80 poles and 90 revolutions per minute make 7,200 alternations per minute, or 60 "cycles" per second. The diameter of the armature for this machine is 16 ft., and its breadth 30 ins. Street railway and other electric motors, storage batteries, switches and switchboards, telephones, kinetoscopes, etc., are on hand, but not in the variety and profusion that might be expected.

The Woman's Building.—The building itself is the gem of the Exposition. It was designed by a woman, Miss Elise Mercur, of Pittsburg. It is of classical style, with tastefully ornamented friezes, cornices and balustrades. The popular verdict as to the success of this building indicates that architecture may prove to be one of the professions for which woman is well adapted.

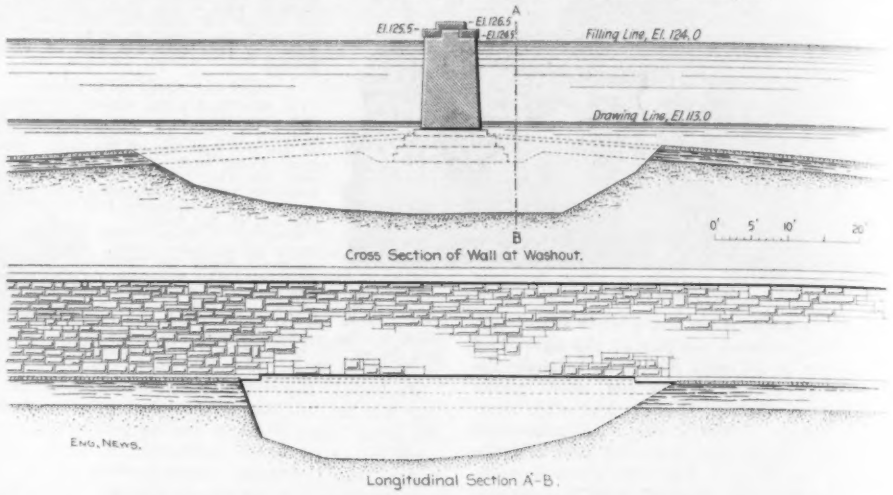


FIG. 1. DIVISION WALL OF SETTLING BASIN, ST. LOUIS WATER-WORKS, SHOWING WASHOUT OF FOUNDATIONS ON OCT. 12.

A PECULIAR ACCIDENT TO THE SETTLING BASIN AT ST. LOUIS, MO.

A very severe test of a masonry wall recently occurred at St. Louis in connection with an accident at the new settling basins for the water-works of that city. The character of the wall and of the accident is described in the following letter and accompanying illustrations sent to us by Prof. J. B. Johnson, of Washington University, St. Louis:

The wall proper is 8 ft. thick, and about 15 ft. high, resting on a concrete foundation 15 ft. wide, and about 4 ft. thick, as shown in Fig. 1. The soil here is river silt, being a various mixture of sand and mud, with occasional layers and pockets of almost pure sand. The bottoms of these basins are composed of 18 ins. of first-class clay puddle and 6 ins. of Portland cement concrete. The latter is laid in blocks 7 ft. square, with joints filled with tar, to allow for expansion. Near the masonry wall the puddle was made 4 ft. in depth, and the first row of concrete blocks settled here nearly 1 in. lower than the second row, which rested on puddle but 18 ins. thick.

The washout shown by the drawings, Fig. 1, and the views, Figs. 2 and 3, occurred on the morning of Oct. 12, when one basin was full of water, and the other empty. Evidently the seepage from the full basin found its way beneath the puddle in the empty basin, and raised it, with its covering of concrete, over an area of about 100 ft. square, like a great blanket, until

FIG. 2 GENERAL VIEW OF BREAK IN FLOOR OF SETTLING BASIN.

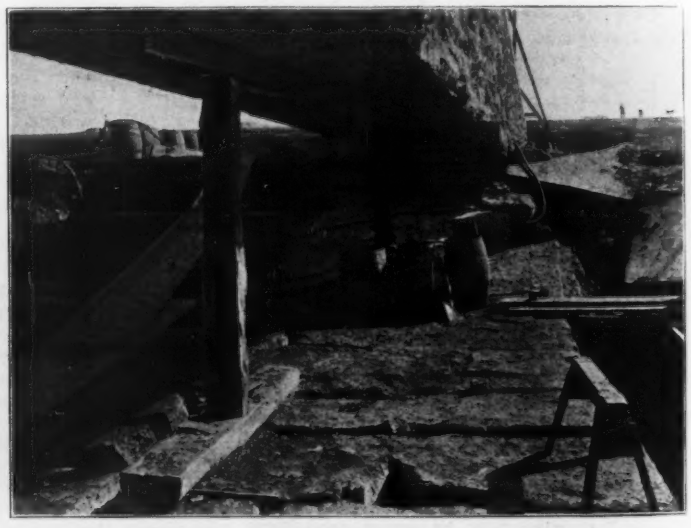


FIG. 3. VIEW FROM PHOTOGRAPH TAKEN NEAR CENTER OF WORN-OUT CONCRETE FOOTING COURSES AT BOTTOM OF BREAK.

preserved and canned fruits, furniture and upholstery, boots and shoes, horseshoes, wire goods, harness, a newspaper, a car coupler, a model steamboat, etc. The most extensive exhibit in the building is that of needlework, by over 100 separate exhibitors. If this had been culled down to one-quarter of the amount, the general effect would have been better. Quite a number of paintings are shown, which are mostly very bad, but they prove that the negro has some artistic taste and aspiration, which is worthy of cultivation. There are about 30 exhibits from as many schools and colleges, showing the work of the students. Much of

The Manufactures and Liberal Arts Building.—This is the largest building in the Exposition. It covers a space of 350 × 260 ft., and contains a floor area, including the galleries, of 103,000 sq. ft.

The exhibit in this building, as a whole, is little better than commonplace, such as may be found in local fairs and exhibitions, such as those held at Pittsburg and St. Louis every year. A notable exception is the Italian exhibit, which is excellent. It contains the products of no less than 72 Italian firms, and includes sculpture, paintings, artistic work in glass, wood and metals, embroideries, mosaics, food products, textiles, etc., in great variety.

it burst through and washed out a hole beneath the stone wall, with a clear span of 61 ft. along the wall, and about 12 ft. in depth. After the washout occurred, the concrete footing courses of this wall dropped to the bottom of the hole, but the masonry wall itself remained standing, with no appreciable distortion or sag on a clear span of 61 ft.

While this exhibit is an excellent testimony of the monolithic character of first-class cement masonry, it also illustrates the difficulty of making an absolutely water-tight reservoir bottom. In this instance the washout occurred in a pocket of almost pure sand, and it will be repaired by simply filling the hole under the wall with concrete, and the rest of the space with clay puddle. While it was known that such accidents might happen to these walls, it was not practicable to put in cut-off walls down to the rock, which here lies at a depth of about 30 ft. Since cut-off walls, therefore, could not have been extended to an impervious stratum, they were not used at all, it being considered more economical to build directly on top of the ground, making the reservoir bottom as impervious as possible, and taking such risk as would follow, rather than to greatly increase the cost of construction by going to further expense, in order to obtain a greater insurance against accident.

While such failures may occur again in the future, the cost of repairing them will probably not be so great as to make it appear that the methods used in construction were not the cheapest in the end.

This settling basin was described and illustrated in our issue of April 18, 1891, and we then commented upon the apparent excellent quality of the work.

STATISTICS OF THE RAILWAYS OF THE UNITED STATES IN 1894.

We have received advance sheets of the seventh annual report of the Statistician to the Interstate Commerce Commission, Mr. Henry C. Adams, and extract therefrom the wollowing particulars of chief interest to our readers:

The report is for the year ending June 30, 1894, and this fact must be borne in mind continually in studying its statistics. It represents the average conditions of two years ago, and not those of the present time. The total mileage of railways in the United States at the close of the fiscal year named was 178,808 miles, of which 176,602 miles was officially reported to the statistician. The increase in mileage over that existing on June 30, 1893, was 2,247.5 miles, or 1.27% of the total. This total gives 6.02 miles of railway to every 100 square miles of territory, and 26.36 miles to every 10,000 inhabitants, on the basis of a population of 67,801,571, and excluding Alaska in the area considered. The increase in mileage shows a low percentage, as this increase was 2.80% for the year ending June 30, 1893, 1.88% for 1892, 2.94% for 1891, 4.78% for 1890, 3.22% for 1889, 6.05% for 1888, and 9.08% for 1887. The total official and unofficial mileage of railways on June 30, 1888, was 149,901 miles, so that the total increase since that time has been 28,807 miles. The statistician adds that while the percentage of increase for 1894 is the lowest since the establishment of the Commission, the current record of railway construction does not warrant the expectation that the year ending June 30, 1895, will show any material improvement. The construction in 1894 does not seem to be localized, the extensions being fairly well distributed over the whole country.

The aggregate length of all tracks, including single, double, third and fourth tracks, yard tracks and sidings, was 233,533 miles. Besides single-track mileage this covers 10,499 miles of second track, 953 miles of third, 711 miles of fourth track, and 42,662 miles of yard track and sidings. The percentage of increase in single-track was 1.27 for the year 1894, 4.46% for second track, 4.40% for third track, 6.36% for fourth track and 1.47% in yard track and sidings. These figures would seem to indicate that a greater amount was expended in developing existing property for an assured traffic than in extending lines for the creation of new traffic.

In the classification of mileage according to organization for operation, there is no marked tendency towards further consolidation of interests. On June 30, 1894, the total number of corporations was 1,924, an increase of 34 over 1893, but this includes many corporations which only keep up a legal existence on account of the character of the property. The corporations maintaining separate operating accounts numbered 945, of which 745 were independent and 200 were subsidiary companies, keeping separate operating accounts. Fifty-one roads, representing 5,677 miles, were merged, reorganized or consolidated during the year of the report. A significant table is given classifying railways on the basis of operated mileage under five heads, with separate mileages running from 250 to 1,000 miles. This table shows that, in 1894, 44 operating corporations, with a mileage of over 1,000 miles each, owned 100,547 miles of railway, or 56.30% of the total mileage; 23 corporations, with from 600 to 1,000 miles each, owned 11.20% of the total, and 907 corporations, with less than 250 miles each, owned only 18.94% of the total mileage.

The railway equipment is given in detail by groups of states, but these returns may be aggregated and compared with those of 1893 as follows:

Class.	1893.	1894.
Locomotives, passenger	9,607	9,893
Freight	19,603	20,000
Switching	4,985	5,086
Unclassified	593	513
Total	34,788	35,492
Leased	2,014	2,512
Cars, passenger	32,911	33,018
Freight	1,201,273	1,205,169
Company's service	39,762	39,891
Total	1,273,946	1,278,078
Leased	154,068	181,664
Fast freight lines	34,270	44,212

In the above statement the summaries of locomotives and cars leased and used for fast freight are given for the information contained; they are already included in the totals reported as in service. The increase in the total of cars was only 4,132 in 1894, as compared with an increase of 58,854 in 1893 over 1892. This falling off in the regular increase is one of the marked features of the present report, and may be regarded as one of the important results of the hard times, which, as every one knows, affected the railways most severely. The statistician reports that in some cases corporations actually reported a less number of cars than the year before, but explained this by stating that they were replacing old 12 and 15-ton cars by new ones of 30 tons. But even with all proper allowance for changes of this character, there was in 1894 a very great falling off in the regular yearly increase of railway equipment. This fact is further shown by tables of the assignment of equipment to amount of traffic for 1893 and 1894, showing a general decrease.

The decrease in traffic during the year of the report is, of course, responsible for much of this decrease in railway efficiency. There was a decrease of 6,557 passengers carried in 1894 for each passenger locomotive, and the decrease in passenger-miles per passenger locomotive was 22,971. As regards freight, 6,101 tons less per freight locomotive were carried in 1894 than in 1893, and the ton-miles per freight locomotive were 757,418 less. The number of freight cars per 1,000,000 tons of freight carried was 276 greater in 1894 than in 1893.

The portion of the report which deals with the statistics of equipment of rolling stock with automatic brakes and continuous couplers is of such interest and importance that we have reviewed it in a separate article in this issue.

Under the head of men employed upon railways, we find a total of 779,608 as compared with 832,602 in 1893, or 444 men per 100 miles of line, against 515 in the previous year, and 486 in 1891. As showing where this reduction has taken place, it is noted that the decrease per 100 miles of line has been 14.29% in general administration, 18.54% in employees assigned to maintenance of way and structures, 16.50% in maintenance of equipment and 11.11% in the men employed in conducting transportation. A new feature in the report is the average daily compensation of railway employees for the years 1892, 1893 and 1894. These tables show that, as a rule, corporations have economized by reducing forces rather than by lowering wages in the year of the report. Engine-drivers and conductors alone receive more than $3 per day; general office clerks, firemen, machinists and carpenters average from $2 to $3 per day, and all other employees average less than $2 per day.

The total railway capital (total of stocks and bonds at par value) on June 30, 1894, was $10,796,473,813, a slight increase over the return of 1893. The amount of capital per mile, however, has decreased from $63,421, in 1893, to $62,951, in 1894. On the above date the total funded debt was $5,356,583,019, or $31,233 per mile, as compared with $31,545 in 1893. The aggregate of stocks was $4,834,075,659, or $28,186 per mile in 1894, as compared with $28,184 in 1893. On the whole, the change in railway capital has been relatively small in the year 1894. During 1894 63.43% of the total stocks paid no dividend, and 17.29% of the funded debt no interest; 34% of the stock paid 5% or more, and only 18% of the bonds paid over 6%.

The passenger and freight service is shown in the following condensed table:

	1893.	1894.
Passengers carried	593,560,612	540,688,199
Carried one mile	14,229,101,084	14,289,445,863
Carried 1 mile per mile of line	83,809	81,333
Tons carried	745,119,482	638,186,553
Carried one mile	93,588,111,833	80,335,104,762
Carried 1 mile per mile of line	551,252	457,252
Average tons on train	185.97	179.80
Revenue per ton per mile, cts.	.....	0.86
Loss revenue, decreased tonnage	.....	$113,975,861

The report discusses at length the statistics of earnings and expenses of railways in 1894. The gross income from operation of the railways of the United States for the year ending June 30, 1894, was $1,073,361,797, or $147,390,077 less than in 1893. After deducting operating expenses, the net income from operation was $341,947,475, or a decrease of $50,883,100 from the returns of 1893.

The final net income, or the fund from which dividends are paid, obtained by adding income from property and investments to income from operation, and deducting from this the fixed charges, was $55,755,970. As the amount paid in the year in dividends and other payments from net income was $101,607,264, it is evident that the railway companies incurred an indebtedness of $45,851,294 in maintaining the money value of stocks by the payment of dividends.

In 1894 the gross earnings from operation per mile of line operated was $6,109, a decrease of $1,081 from the previous year; the operating expenses were $4,163 per mile of line; the net income per mile was $317 after total deductions, while $578 per mile was paid in dividends and "other payments" from net income. The passenger revenue was $285,349,558, a decrease of $16,142,258, notwithstanding the increase in passenger mileage. This decrease of revenue was due to a reduction in rate per passenger per mile, the rate being 1.986 cts. in 1894, as compared with 2.108 cts. in 1893. The earnings from freight was $669,490,913, as compared with $829,053,861 in 1893, a decrease of $129,562,948, or 15.63%. The totals for 1893 and 1894 show that the railways had $154,222,887 less money to spend in the latter year. As a consequence, $25,588,990 less money was expended on the maintenance of way and structures than in 1894, the amount charged to this account being $143,669,386 in 1894. The expenditure for maintenance of equipment was $112,894,526, or $23,981,383 less than in 1893, and the sum of $394,513,035 was spent for conducting transportation, or $40,952,540 less than 1893. The difference between the two years may be better appreciated in the following table:

Percentage of operating expenses assigned to	1893. Per cent.	1894. Per cent.
Maintenance of way	20.45	19.64
Maintenance of equipment	16.53	15.43
Conducting transportation	52.60	53.94
General expenses	10.33	10.91
About	100.00	100.00

This indicates in another manner that the saving effected was in maintenance of way and equipment rather than in the cost of conducting transportation and in general expenses. The general percentage of operating expenses to operating income was 68.14% for all the railways in the United States. This percentage was 67.82 in 1893, 66.67 in 1892, 66.73 in 1891, 65.80 in 1890 and 66.81 in 1889.

The number of railway employees killed during the year of the report was 1,823, and 23,422 were injured. As compared with 1893, this shows a decrease of 904 employees killed and 8,307 less injured. But it must be considered that there were 93,944 less men employed in 1894 than in 1893. The Commission, however, suggests that this de-

crease may also be due in part to the fact that the equipment was undoubtedly of a higher grade than in previous years, and that in discharging careless and unskillful men in the reduction of force, the grade of labor may have been raised. The number of passengers killed in 1894 was 324 and 3,034 were injured. This is an increase over 1893 of 25 killed, but a decrease of 195 injured. Under the head of "other persons," 4,300 were killed and 5,433 injured. The report does not attempt to account for the large numbers in this third class, but it suggests that the returns probably cover a considerable number of suicides. Among railway trainmen, 181 men were killed and 5,539 injured by coupling accidents, and 344 were killed and 2,203 injured by falling from trains and engines.

This report contains as an appendix a series of interesting diagrams, or graphical exhibits, of railway statistics for the years covered by the work of the Interstate Commerce Commission, or 1889 to 1894, inclusive. These diagrams tell better than tables of figures the general story of railway progress in these years, and the relative status of affairs for the separate years considered.

The introduction of the electric launch upon our waterways has not been so general during the past two years as its great success at the Columbian Exposition would seem to warrant; it has been put into operation at a few places, however, with most satisfactory results, and the prospects are good for a large increase in the demand for this type of launch during the coming year. The testimony of the users of electrically propelled boats seems to indicate that they are more economical in operation than steam launches. The electric boat must have at hand a current for charging purposes, and for this reason it is especially adapted for operation in connection with electric railways, which are, in fact, the principal purchasers of the electric launch at the present time. As an example of this practice might be mentioned the fleet of five launches operated by the Milwaukee Street Ry. Co., which, during the past summer, carried 14,000 passengers. The Atlanta Exposition has equipped its artificial lake with six launches, which are used for a service similar to that so popular at the World's Fair. Each boat contains 56 storage cells of the chloride accumulator type, charged from a generator in Machinery Hall. Five of the World's Fair launches are in regular operation at Jackson Park, Chicago, having found sufficient patronage each summer to warrant their continuance. A half-dozen other similar installments might be described. For river and lake transportation over short distances, the electric launch is pre-eminently fitted, and this field is sufficiently broad to insure many developments and improvements in the near future.

The centrifugal separator, for mechanically extracting cream from milk, has brought about a revolution in the dairy business, and is now in extensive use throughout the world. Norway, Sweden and Denmark are the great dairy countries of Europe, and we believe the first separators were invented and used in Sweden. Recently an inventor has carried the butter-making industry a step farther in advance by designing a machine in which the butter is extracted from the milk in a single operation. It is called the radiator, and performs the double function of separator and churn. The milk is first sterilized by heating, then delivered to the separating chamber of the radiator, where the cream is separated from the milk by centrifugal action in the usual way. The speed of revolution of both the separating and churning chambers is 6,000 revs. per min. After separation, the cream is cooled by circulating in refrigerating tubes. When introduced into the churn, the cream divides into two streams, one portion ascending the interior of a cylinder perforated with fine holes, situated in the center of the churning chamber, and the second portion rising on the walls of the churning chamber. The violent impact of the particles thrown from the inner cylinder upon the cream on the surrounding walls produces butter. The entire operation requires but one minute, and during that time the sterilized materials are protected against contact with the air, thus insuring an absolutely pure product. It is said that butter made in this way will remain sweet longer than when, as ordinarily is the case, a "souring" process intervenes between separation and churning.

The preservation of fruits for a considerable length of time after gathering has never been very successfully accomplished, and as a consequence the prices paid for them out of season are exorbitant. Experiments have been recently reported from the laboratory of the National Horticultural School of Versailles, France, which point to a means for securing this desired end. The process consists simply in surrounding the fruit with an atmosphere of alcoholic vapor, which very greatly retards the process of decay. In the experiments in question, several bunches of grapes, newly picked, together with a bottle of alcohol were enclosed in an air-tight brick chamber. Other bunches were put in similar chambers, but without the alcohol. All the chambers were in a damp cellar, at a temperature of 46° to 50°. At the end of three weeks the grapes in all the chambers but the one box containing the alcohol were fully decayed and worthless. At the end of two months, the fruit in the chamber containing the alcohol was still in fine condition, only two or three grapes on each bunch showing any signs of decay. The cover of the chamber was of wood and did not close hermetically, otherwise the results might have been still more favorable. The success of this experiment would seem to show that if carried out on a large scale this process might prove of great commercial value.

Great progress in the tin-plate industry of the United States is shown in a report by Special Treasury Agent Ira Ayer, which has recently been made public, containing statements of the quarterly production of tin and terne plates manufactured during each of the four years since the establishment of the industry:

Tin and Terne Plate Production.

Fiscal year ending June 30.	From American black plate, lbs.	From foreign black plate, lbs.	Total, lbs.
1892	9,296,553	4,350,166	13,646,719
1893	43,599,724	56,219,478	99,819,202
1894	85,968,202	53,255,265	139,223,467
1895	160,576,934	33,224,139	193,801,073

The production of black plates in the fiscal year ending June 30, 1895, was 185,571,479 lbs., and of the year preceding 98,970,880 lbs., showing an increase of 87½%. Black plate was made in 28 rolling mills in 1895. Tin plate was made by 48 firms, of which 39 used American black plates exclusively, and the other 9 both foreign and American plates. The American black plate used was 93% of the entire production. Twenty-six new firms in June, 1895, were building and preparing to make tin plates, and 28 firms made enlargements during the year. The statement of comparison of production and importation of tin and terne plates is as follows:

	Lbs.
Total imports during the fiscal year ended June 30, 1895, were	513,963,401
Total exports for the same period	126,777,800
Showing net imports	387,185,601
Total domestic production	193,801,073
Approximate consumption in the U. S.	580,986,674
Average annual capacity of mills completed June 30, 1895 (144), say	450,000,000
Same, of mills completed and in process of construction June 30, 1895, say	570,000,000

A die-sinking process, notable for extreme simplicity, cheapness and beauty and durability of results, is employed in the works of "The Patent Steel Die Co.," of Bridgeport, Conn. Ordinarily, die-sinking is an expensive process, involving the exercise of great skill and the expenditure of a vast amount of time. Its cost is such as to prohibit its use in many cases where such a method of reproduction would be most convenient. In brief, the usual method consists in graving by hand in the face of a specially-annealed steel block, the matrix or form from which duplicates of the model are to be struck. The die is then prepared for the stamping machine by a very careful hardening and tempering process. In the simpler method invented by Mr. George F. Champney, the first step is the reproduction of the model in cast iron. In cases where the model cannot be molded directly, a plaster cast is made from it, and used as a pattern. The iron casting must be very skillfully made, since any imperfection will be reproduced in the die. The cast iron piece is fixed to the bottom face of a drop hammer, weighing from 1,000 to 2,500 lbs., and falls upon a block of hot die steel, producing therein a reversed copy of itself in intaglio. The length of drop is an important factor in the character of the result, and is varied with the size of die to be formed. The maximum velocity attainable at the moment of impact is about 50 ft. per second. After being struck, the die undergoes a hardening process, which does not differ materially from that usually employed. It is claimed that dies made in this way are from five to ten times as durable as those made by the ordinary process. A fuller account of this invention is given in the "American Machinist" of Sept. 26.

The control of the shifting sand dunes on the seashore of Denmark has been made the subject of considerable experimentation by the government of that country. The prevailing heavy winds sweep across the sand hills near the sea and carry the sand far into the interior, creating a vast desert where cultivation is impossible. The method which has there been developed consists in planting a belt of pine trees at some little distance from the shore, and sowing on each side of this belt seeds of grasses which grow well in a sandy soil. The young trees are raised in well-protected nurseries situated in the sand dunes themselves, as it is necessary that they be thoroughly acclimated before planting. They are set out in the fall or spring and are protected in their early growth by obstacles of hedges, hurdles, etc. After several years this growth becomes an efficient wind-break, and so protects the interior that cultivation is made possible. During the 27 years in which this work has been progressing, about 14,000 acres of sand surface have been reclaimed.

The Pullman Palace Car Co., at its annual meeting of Oct. 17, reported total revenue from earnings on cars, rentals, interest, etc., as amounting to $8,547,624 for the past year. The operating expenses were $3,511,929; the proportion of net earnings paid to railways was $746,204, and the dividends on capital stock were $2,880,000. The company owns and controls 2,556 cars. The president of the company stated that the demand for new cars did not equal the existing facility for supply, and the company had been compelled by competition to take contracts absolutely without profit. Mr. Pullman explained the decrease in net earnings, as compared with last year, by saying that the fiscal statement of 1894 included the last three months of the World's Fair travel of 1893.

The three reports of the Engineers of the Inter-continental Railway Commission are completed; one is now published, and the other two are passing through the press at Washington. Lieut. M. M. Macomb, U. S. A., had charge of the surveys from Ayutla, on the southern frontier of Mexico, to the Savegre River, Costa Rica, Party No. 2 was under the charge of Mr. William F. Shunk, C. E., of Harrisburg, Pa., who surveyed north from Quito, Ecuador, a distance of 1,700 miles, to connect with the first survey. Party No. 3, under Mr. William G. Kelly, C. E., of Philadelphia, surveyed 1,734 miles south and east from Quito to Lake Titicaca, on the western confines of Bolivia. A railway 70 miles from Titicaca connects with the railway system of the Argentine Republic, which extends to the borders of Patagonia. The surveys of the Commission cover about 4,500 miles, and the average estimate of the cost of construction is about $35,000 per mile, representing a total cost to the governments interested of $180,000,000. The general report of the engineers is said to be favorable as to climate, feasibility of construction and the wealth awaiting development; but it is also evident that there are great financial and political difficulties to be overcome inherent in the present status of the South American states.

A resolution in favor of municipal ownership of the water-works of Denver and instructing the city attorney on the necessary steps to that end, whether by purchase or construction, has been adopted by the Board of Supervisors of that city. A rate-cutting rivalry, which has long existed between two water companies, and which was recently followed by a consolidation, an advance in rates, and strong public opposition to the latter is doubtless largely responsible for the above resolution.

Water rates in Des Moines, Ia., where the water-works are owned by a company, may be fixed by the city council, according to a decision just rendered by the Supreme Court of Iowa, and the burden of proof will be upon the company if it believes the rates to be unreasonable, and appeals to the courts for relief. The right to fix rates for water and gas service was conferred upon cities of Iowa by a legislative enactment some years ago, but the contract between the city of Des Moines and the old Des Moines Water Co. was made before that date. The parts of the contract relating to rates were modified by mutual consent in later years, and it was finally provided that after Jan. 1, 1893, the rates previously in force should cease, if either party should so elect, after which the rates for fire protection and to private consumers should be the average rates charged in other cities in the United States having efficient water-works operated by private water companies. In case of disagreement, these rates were to be established by arbitration. Briefly put, the court holds that such a standard for fixing rates is "indefinite, impracticable, and unreasonable," and that it is not a method which would guarantee reasonable rates, which is all the company can demand. This clause in the Des Moines franchise was discussed in our issue of Feb. 27, 1892, in an editorial entitled "The Regulation of Private Water Rates." Interesting in this connection is a mandamus issued by a district court at Denver, compelling the city council to force the Denver Union Water Co. to fix rates which shall conform to the average of those paid in the three cities of Chicago, St. Louis and Cincinnati, in accordance with a contract of 1890, which provides that after five years the council may order the company to establish such rates. The court holds that this power was conferred upon the council, not for its benefit, but for the good of the citizens. A large number of citizens having requested the mandamus, the order was issued. Ruinous rates prevailed in Denver during a period of rivalry between two companies. Since consolidation, new rates have been established, which many of the citizens claimed were excessive.

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PERSONALS.

Mr. Robert Brown, the distinguished English botanist, died at London, on Oct. 26.

Mr. John H. Chapman, a Boston architect, died on Oct. 25, at Fredericksburg, Va.

Mr. William McKay, a prominent Indiana contractor, died on Oct. 18, at Martinville, Ind., aged 60 years.

Mr. John B. Farnham, inventor of the Farnham typesetting machine, died at Hartford, Conn., on Oct. 25, aged 76.

Mr. D. K. Ramey has been elected Water Commissioner of Altoona, Pa., to succeed Mr. James Turner, deceased.

Mr. Albert E. Loomis has been appointed Superintendent of the newly-purchased water-works plant at Oneida, N. Y.

Messrs. E. L. Bosworth, J T. Warlick and W. W. Vandiver have been appointed a board of water commissioners at Rome, Ga.

Mr. L. P. Smith has been appointed General Superintendent of the Delaware, Susquehanna & Schuylkill road, succeeding Mr. Daniel E. Coxe, deceased.

Mr. I. B. Lowell, Mr. E. B. Dickinson, and Mr. Daniel W. Wells have been appointed Water Commissioners of Hatfield, Mass., where an appropriation of $30,000 was recently voted for the establishment of a water system.

Mr. Charles Wibberly, Manager of the Buenos Ayres & Rosario Railway, who has been in the United States studying American railway methods, sailed from this port for Europe on the steamship "Germanic" last week.

Mr. Emil Swensson, M. Am. Soc. C. E., has been appointed Superintendent of the Bridge Department of the Carnegie Steel Co., Ltd., of Pittsburg, Pa. Mr. Swensson has for several years had full charge of the drawing room of the Keystone Bridge Works.

Mr. A. P. Kilganan, a well-known Canadian engineer, died at Toronto, on Oct. 22. Mr. Kilganan had been identified with the Public Works Department of Ottawa, and with various Government projects. He was the promoter of numerous important engineering enterprises on Mantoulin Island.

Messrs. Voorhees & Witmer, civil and hydraulic engineers, of Buffalo, N. Y., dissolved partnership on Oct. 10, by mutual consent, with the proviso that the work on hand at that date should be carried to completion jointly. Both members of the former firm are now engaged in the practice of their profession independently.

Mr. Holbrook Cushman, Instructor in Physics in Columbia College, died in New York, Oct. 25. Mr. Cushman was a graduate of the School of Arts, Columbia College, in the class of '78. After leaving college he went abroad and studied physics for four years at the University of Wurzburg, Germany. He then assumed charge of the electrical department of a large establishment in Manchester, England. Returning to this country, he was made assistant to Prof. O. N. Rood, in Columbia College.

Mr. P. H. Hezing, with Mr. B. M. Harrod, Vice-President Am.Soc.C. E.,and a member of the Mississippi River Commission, and Mr. H. B. Richardson, State Engineer of Louisiana, have been selected by Mr. L. W. Brown, City Engineer of New Orleans, to act with him as an advisory engineering committee, to prepare detailed plans and specifications for the drainage of New Orleans. The appointment of this committee is a step recently authorized by the city council.

ENGINEERING SOCIETIES.

COMING TECHNICAL MEETINGS.

TECHNICAL SOCIETY OF THE PACIFIC COAST.
Nov. 1. Secy., O. H. Von Geldern, 819 Market St., San Francisco.
ENGINEERING CLUB OF COLUMBUS, O.
Nov. 2. Secy., David Buell.
ENGINEERS' CLUB OF PHILADELPHIA.
Nov. 2. Secy., L. F. Rondinella, 1122 Girard St.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.
Nov. 4. Secy., G. L. Annan, City Engineer's Office.
ENGINEERING SOCIETY OF WESTERN NEW YORK.
Nov. 4. Secy., Geo. R. Sikes, 122 Pearl St., Buffalo, N. Y.
COLUMBIAN ENGINEERING SOCIETY.
Nov. 5. Secy., W. F. Hart, University Building, 15th and H Sts. N. W., Washington, D. C.
WESTERN SOCIETY OF ENGINEERS.
Nov. 6. Secy., Chas. J. Roney, Monadnock Block, Chicago.
ENGINEERS' CLUB OF ST. LOUIS.
Nov. 6. "Chimneys and Chimney Draft," by W. E. Worthen. Secy., W. H. Bryan, Turner Block.
AMERICAN SOCIETY OF CIVIL ENGINEERS.
Nov 6. "The Discharge of the Mississippi River," by Wm. Starling. Secy., C. W. Hunt, 127 E. 23d St., New York.
CANADIAN SOCIETY OF CIVIL ENGINEERS.
Nov. 7. Secy., C. H. McLeod, Montreal.
CENTRAL RAILWAY CLUB.
Nov. 8. Secy., H. D. Vought, "Courier" Office, Buffalo, N.Y.
MONTANA SOCIETY OF CIVIL ENGINEERS.
Nov. 9. Secy., Forrest J. Smith, Denver Block, Helena, Mont.
INDIANAPOLIS ENGINEERING CLUB.
Nov. 9. Secy., C. C. Brown, City Engineer.
ENGINEERS' CLUB OF KANSAS CITY.
Nov. 11. Secy., F. W. Tuttle, Baird Building.
CIVIL ENGINEERS' CLUB OF CLEVELAND.
Nov. 12. Secy., F. A. Coburn, Case Library Building.
DENVER SOCIETY OF CIVIL ENGINEERS.
Nov. 12. Secy., H. Breen, 36 Jacobson Block.
NORTHWEST RAILWAY CLUB.
Nov. 12. Secy., G. A. Seley, 80 Metropolitan Block, St. Paul, Minn.
NORTHWESTERN SOCIETY OF ENGINEERS.
Nov. 12. D. W. McMorris, Burke Bldg., Seattle, Wash.
WISCONSIN POLYTECHNIC SOCIETY.
Nov. 12. Secy., W.K. Means,Loan & Trust Bldg.,Milwaukee.
NEW ENGLAND RAILROAD CLUB.
Nov. 13. Secy., F. M. Curtis, P.O.Box 1576, Boston, Mass.
ENGINEERS AND ARCHITECTS' CLUB OF LOUISVILLE.
Nov. 14. Secy., Jas. K. Zollinger, Norton Building.
ENGINEERING ASSOCIATION OF THE SOUTH.
Nov. 14. Secy., H. D. Ruhm, Nashville, Tenn.
ENGINEERS' CLUB OF MINNEAPOLIS.
Nov. 18. Secy., E. Nexson, Kasota Block.
WESTERN RAILWAY CLUB.
Nov. 19. Secy., W. D. Crosman, Rookery Bldg., Chicago.
ENGINEERS AND ARCHITECTS' ASSOCIATION OF SOUTHERN CALIFORNIA.
Nov. 20. Secy., F. Van Vleck, Los Angeles, Cal.
ASSOCIATION OF ENGINEERS OF VIRGINIA.
Nov. 20. Secy., J. A. Pilcher, Roanoke, Va.
BOSTON SOCIETY OF CIVIL ENGINEERS.
Nov. 20. Secy., S. E. Tinkham, City Hall.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.
Nov. 20. Secy., R. W. Pope, 26 Cortlandt St., New York
SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.
Nov. 21. Secy., F. A. Charpiot, Macon, Ga.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.
Nov. 21. Secy., D. Carhart, Carnegie Library, Allegheny.
ENGINEERS' CLUB OF CINCINNATI.
Nov. 21. Secy., J. F. Wilson, Odd Fellows' Temple.
NEW YORK RAILROAD CLUB.
Nov. 21. Secy., John A. Hill, 256 Broadway, N. Y.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.
Dec. 2. Secy., F. R. Hutton, 12 W. 31st St., New York.
NORTHWESTERN TRACK AND BRIDGE ASSOCIATION.
Dec. 13. Secy., D. W. Meeker, St. Paul, Minn.

ENGINEERS' CLUB OF PHILADELPHIA.—Oct. 19 Mr. W. C. Furber read a paper upon the "Durability of Iron in Modern Building Construction," chiefly devoted to a general review of the various methods proposed for the prevention of corrosion. The author freely acknowledged his indebtedness to Mr. M. P. Wood, who recently presented a paper upon the subject to the American Society of Mechanical Engineers. Considerable discussion followed.

L. F. Rondinella, Secy.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—At the regular monthly meeting, held at New York, on Oct. 23, two papers were presented. "The Local Annealing of Hard-Faced Armor Plate," by Hermann Lemp, Jr., is abstracted in another column. "The Rating and Behavior of Fuse Wires," by W. M. Stine, H. E. Gaytes and C. E. Freeman, was read by title in the absence of the authors. This paper had been sent to members of the Institute in advance of the meeting, and it brought out a lengthy discussion, in which there seemed to be developed little more than the fact of the great unreliability of fuses and the indefiniteness of knowledge concerning them.

AMERICAN INSTITUTE OF ARCHITECTS.—At the third day's session of the 29th annual convention, the following officers were elected for the ensuing year: President, George B. Post, of New York; First Vice-President, Henry Van Brunt, of Kansas City; Second Vice-President, William C. Smith, of Nashville, Tenn.; Secretary, Alfred Stone, of Providence, R. I.; Treasurer, Samuel A. Trent, of Chicago. The following Board of Directors was elected to serve for three years: D. H. Burnham, Chicago; James W. McLaughlin, Cincinnati; W. S. Eames, St. Louis; Charles F. McKim, New York; F. Miles Day, Philadelphia; H. Langford Warren, Boston; Normand S. Patton, Chicago; Robert D. Andrews, Boston, and W. R. Briggs, Bridgeport, Conn. The next convention will be held in Nashville, Tenn.

MICHIGAN ENGINEERING SOCIETY.—The following officers have been elected for the ensuing year: President, George L. Wells; Vice-President, Frank F. Rogers; Secretary-Treasurer, F. Hodgman; Directors, Dorr Skeels, Wm. B. Sears and William Appleton. It has been decided to hold the next convention in Saginaw, Jan. 7, 8, and 9, 1896. The following papers have already been promised: "Some Notes on Cleaning Sewers," by Geo. M. Ames; "Care of Waste Products of Lumber Woods," by J. J. Hubbell; "Levees of the Mississippi River," by W. L. Cummings; "Timber Preservation," by Geo. L. Wells; "Remedy for Moving Sand," by E. W. Muenscher; "Stone Industries of Huron County," by W. H. Wallace; "Construction and Cost of Stone Roads," by M. H. Bailey; "Irrigation Engineering," by Prof. L. G. Carpenter; "Improvement Work on T., A. A. & N. R. R.," by H. E. Riggs; "Special Assessments for Drains and Section Surveys," by E. Strong.

NEW PUBLICATIONS.

DAMS AND RESERVOIRS OF RHODE ISLAND. Report of the Commissioner, L. M. E. Stone, for 1894. 8vo; pp. 41; 12 illustrations.

This report briefly describes some of the dams of the state and repairs made during the year, or needed in the near future.

SANITARY INSPECTION OF THE STATE INSTITUTIONS OF NORTH CAROLINA and the Water Supply and Sewage Disposal of Towns. By J. C. Chase, Engineer of the North Carolina State Board of Health. 8vo; pp. 25. Address the Board, Raleigh, N. C.

This little pamphlet treats in a brief and interesting manner the subjects named in its title.

A SHORT DESCRIPTION OF THE BOSTON WATER-WORKS. By Desmond FitzGerald, Resident Engineer, etc. Published under Authority of the Boston Water Board. 8vo; cloth; pp. 42; illustrations.

This is a handy description of these unusually interesting works. The name of the author attests the character of the work.

MEASUREMENT OF WATER. Bulletin No. 6 of the Montana Agricultural Experiment Station, Bozeman, Mont. By A. M. Ryan, Irrigation Engineer. 8vo; pp. 22; six illustrations and two tables. Address the Station.

This Bulletin presents in brief compass some of the salient points regarding the measurement of water, with reference chiefly to irrigation.

PRODUCTION AND PRICE OF COTTON FOR ONE HUNDRED YEARS. By James L. Watkins. Pub. Doc., U. S. Department of Agriculture, Washington, D. C. Paper; 8vo; pp. 20.

This report gives in tabular form the supply, consumption and price of cotton for each year from 1791 to 1895, with notes as to each year. In 1791 the price was 26 cts. per lb. in this country and 26 to 60 cts. in England, while in 1895 it averaged 6.26 cts. and 6.68 cts., respectively.

DER ZUSTAND DER ANTIKEN ATHENISCHEN BAUWERK auf der Burg und in der Stadt. By Prof. Dr. Josef Durm. Berlin: Wm. Ernst & Sohn. Folio; boards; pp. 18; with 18 illustrations.

This is a monograph treating of the condition of the structures in the ancient city of Athens, including both those on the Acropolis and in the city proper. The author describes the present condition of these historic ruins, and suggests methods for their permanent preservation in their present condition.

MEASURING WATER. By Clemens Herschel, Hydraulic Engineer. An Address to the Students of the Rensselaer Polytechnic Institute, Troy, N. Y. Reprinted from the "Polytechnic" by the Builders' Iron Foundry, Providence, R. I. 8vo; paper; pp. 28; illustrations.

This is a historical and descriptive discussion of means employed for measuring water. It closes with an account of the Venturi meter, invented by the author and now manufactured by the publishers of the reprint. All the illustrations relate to the Venturi meter.

OBSERVATIONS ON THE TEMPERATURE OF SURFACE WATERS and the Effect of Temperature on the Growth of Micro-Organisms. By Geo. C. Whipple, Biologist, Boston, Mass. Reprinted from the Journal of the New England Water-Works Association, Vol. IX., No. 4, 8vo; pp. 22; illustrated. Address the author, care of Boston Water Board.

The variations and effects of temperature upon the character of stored waters are a very interesting subject. Mr. Whipple has for a number of years been biologist at the Chestnut Hill pumping station of the Boston water-works and has had excellent opportunities to study the matter.

ADVANTAGES OF WATER-WORKS for the information of city authorities who are investigating the question of water supply systems. By W. H. Fritchman, M. Am. W. W. Assoc., 95 William St., New York city.

After setting forth the advantages of a public water supply, this pamphlet closes with an offer addressed to municipalities to the effect that the author stands ready to accept a franchise for works, will build the same, and then turn them over to the town for 25% of their actual cost in cash and the balance in yearly installments which will terminate with the life of the franchise.

VENTILATION OF SEWERS DESIGNED ON THE SEPARATE SYSTEM. Opinions by Civil Engineers and Others, Given by Request of the Commissioners of Sewers, Medford, Mass., 1895. Mr. John D. Street, Chairman. 8vo; pp. 17. Address the Commissioners.

The city of Medford proposed supplementing perforated manholes as a means of ventilating sewers by omitting the main trap on house connections, so far as possible, and sought the opinions of experts on the subject. Of 25 replies received from engineers and plumbers, 15 were favorable to ventilating through soil pipes, 6 were strongly against it, and 4 were noncommittal.

SURVEY OF TIDES AND CURRENTS IN CANADIAN WATERS. Report of Progress. By W. Bell Dawson, C. E., Engineer in Charge of Tidal Survey. Ottawa, Canada, 1895. Pamphlet; 8vo; 29 pp. and maps.

The interesting features of this progress report lie in the description of the Strait of Belle Isle, in the methods adopted for fixing tidal gages on this coast, and in the employment of current meters for marine observations. The use of these meters is referred to elsewhere in this issue. This report especially relates to the nature of the currents in the two entrances to the Gulf of St. Lawrence, and such data as were collected are here given.

IRRIGATION IN THE MADRAS PRESIDENCY, INDIA: Administration Report of the Public Works Department for the Year 1893-4. Col. R. R. E. Drake-Brockman, R. E., Chief Engineer. 4to; pp. 118; folding maps and plates. Madras, India; Printed by the Superintendent, Government Press.

This volume describes the irrigation work done during the year, and gives many figures relating to the various operations and expenditures. Some works under construction are briefly described and illustrated, notably the great Periyar masonry dam. This structure will be 178 ft. in height above the deepest part of the river bed. The reservoir thus formed will contain over 13,000,000,000 cu. ft. of water, of which 6,800,000,000 cu. ft. will be available for diversion through a 5,700-ft. tunnel into another valley.

CONNECTICUT CIVIL ENGINEERS' AND SURVEYORS' ASSOCIATION.—Proceedings of the Summer Meeting at Waterbury, Aug. 30, 1894, and Eleventh Annual Meeting, Hartford, Jan. 8, 1895. Geo. K. Crandall, Secretary and Treasurer, New London, Conn. 8vo; paper; pp. 91; Illustrations.

This report contains the following papers: "Notes on Heavy Pipelaying," by R. A. Cairns; "Cast Iron Piles as Supports for Heavy Superstructures in Special Cases," by D. E. Bradley; "The Water-Works of Norwich, Conn.," by Chas. E. Chandler; "Sewage Disposal Works at New Rochelle, N. Y.," by J. K. Wilkes; "The Filtration of Water for Domestic Uses," by Joseph B. Rider; "Electric Railways," by Wm. G. Smith. The New Rochelle sewage disposal works were described and illustrated in Engineering News of Feb. 28, 1895.

LAKE SUPERIOR MINING INSTITUTE.—Proceedings of the Third Annual Meeting, March, 1895. Secretary, F. W. Denton, Minneapolis, Minn. Paper; 8vo; pp. 93; Illustrated.

This is the third volume of the proceedings, and contains the following papers: "The Iron Ranges of Minnesota," H. V. Winchell; "Distribution of Phosphorus and System of Sampling at the Pewabic Mine," E. F. Brown; "Efficiencies of Some Pumping Plants on the Menominee Range," Per Larsson; "New Pumping Plant of the Stirling Iron & Zinc Co., New Jersey," J. Parke Channing; "Hoisting Plant of the Lake Mine," J. M. Vickers; "Relation of the Vein at the Central Mine, Keweenaw Point, to the Kearsarge Conglomerate," L. L. Hubbard; "Open-Pit Mining, with Special Reference to the Mesabi Range," F. W. Denton.

THE MICHIGAN ENGINEERS' ANNUAL, containing the Proceedings of the Michigan Engineering Society for 1895. Published by the Society. F. Hodgman, Secretary, Climax, Mich. 8vo; paper; pp. 224; price, $1.

This report contains the following papers: "Waste and Consumption of Water," by G. S. Williams; "New Lock at Sault Ste. Marie," by J. L. Callard; "Title by Possession," by Judge F. A. Hooker; "Difference in Direction of Magnetic Needles," by C. L. Berger, L. Beckman, W. and L. E. Gurley, and F. Hodgman; "Cement and Concrete," V. Sebrig Hillyer; "Difficulties in Manufacturing," by O. E. Bement; "Old Surveys in Detroit," by Thos. Campau; "Highway Bridges," by H. K. Vedder; "Special Assessments," by M. C. Taft; "Grand Rapids Plaster Quarries," by C. H. Redman; "Sewer Building at Port Huron," by F. F. Rogers; "Mineral Resources of North Arkansas," by E. L. Hayes; "The Austin Masonry Dam," by E. W. Groves; "Highway Grades," by John Randall; "Logging Railroads," by H. C. Thompson; "Work of the Propeller Wheel," by H. C. Pearsons.

GAS AND ELECTRIC LIGHT COMMISSIONERS OF MASSACHUSETTS. Report for 1894. 8vo; pp. 316; many tables. Address the Commissioners, Boston, Mass.

This is a mine of information regarding gas and electric lighting works in Massachusetts. There are now 129 companies or individuals under the supervision of the Board, of which 25 supply both gas and electricity, 46 only gas, and 58 only electric light. In addition, ten towns are now supplying themselves with light. Two supply both gas and electric light, and the balance electric light only. Both companies and municipalities in which companies are operating appeal to the Board for the adjustment of differences regarding rates, quality of service, and other things. The points involved in the several petitions during 1894 are set forth in the first 45 pages of the report. The progress of municipal ownership is next sketched, and this is followed by an account of the accidents caused by electricity and gas during the year. The statistical portion of the volume is very full, and includes, among other things, detailed prices charged for gas and electric lighting, both public and private.

RESENA HISTORICA Y ESTADISTICA DE LOS FERROCARRILES DE JURISDICCION FEDERAL desde Agosto de 1837 hasta Diciembre de 1894.—Mexico, Imp. y Lit. de F. Diaz de Leon. Sucesores, Sociedad Anonima. 1895. Quarto; paper; pp. 156; many maps, tables and diagrams.

This historical and statistical account of the government railways of Mexico is very detailed, and is illustrated by handsome maps in colors, showing contours, towns and some of the adjacent topography. It commences with the railway of 1837, between the City of Mexico and Vera Cruz, and concludes with the latest "industrial" railways for light traffic. The list covers 10,763 kilometers of constructed line, or about 6,673 miles, for the service of a population of 11,642,720, as stated by the compiler. Tables give the number of passengers carried, the freight transported, its character, etc., for the year 1893, and also the financial status of the several systems. Included in the report is an excellent railway map of the United States of Mexico, on a scale of 1 : 4,000,000, showing the limits of the postal zones, the railways built and under construction, etc. A very complete map of the new Tehuantepec railway is given.

ILLINOIS SOCIETY OF ENGINEERS AND SURVEYORS. Tenth Annual Report, being the Proceedings of the Society at its Tenth Annual Meeting, held at Monmouth, Ill., Jan. 23, 24 and 25, 1895.—Secretary, Jacob. A. Harman, Peoria, Ill. Paper; 8vo; pp. 176, illustrated; 50 cts.

This report contains the proceedings of the meeting, and also the following papers: "Purification of Water and Sewage by Downward Filtration," A. N. Talbot; "Sewer Construction in Water Bearing Soils," A. W. Gates; "Construction of a 7-ft. Single-Ring Brick Sewer," C. M. Rickard; "Preservation of all Sources of Water Supply from Sewage Disposal," Robert E. Orr; "The Water-Works of Rockford, Ill.," C. C. Stowell; "How Ottawa Obtained a System of Water-Works," N. E. Stucker; "Western Springs Water System," Ethan Philbrick; "Cost of Pumping Water from Well to Reservoir," R. G. Young; "Brick Pavement Construction," A. D. Thompson; "Absence of Section and Quarter Section Corners in Plain Land Surveying," M. J. Howard; "Comparison in Practice of the Metric and English Systems of Weights and Measures," Arthur Lagron; "Photography for Engineers," John W. Alvord; "Value of Marked Trees in Fixing a Survey," I. H. Serviss; "How to Lay Off a Right Angle with a Transit," I. H. Serviss; "Location and Alinement of Drainage Districts," D. L. Braucher; "Incidents of Practice," Arthur H. Bell; "Laying Out a Race Track," C. H. Tryon; "Easement Curves in Race Tracks," D. L. Braucher; "Best Substructure for Small Bridges," John H. Burnham. There are also discussions on "Effect of Size, Grade and Length of Sewers upon the Efficiency of Automatic Flush Tanks," and "Effects of Frost on Materials and Structures," and the reports of committees on engineering, land and city surveying, municipal engineering, weights and measures, land drainage and public highways, work, and instruments, blanks and records.

TRADE PUBLICATIONS.

FLYWHEELS.—Philadelphia Engineering Works, Limited. Catalogue L. Paper; 6×9 ins.; pp. 8.

The flywheels described in this catalogue are of novel design, having a central rib in the segments to prevent their bending to centrifugal strain. Tables of sizes, horsepower, etc., of wheels for Philadelphia Corliss engines are appended.

REFRIGERATING MACHINES.—Frick & Co., Waynesboro, Pa. Paper; 6×9 ins.; pp. 196; fully illustrated.

This catalogue contains, together with an account of the principles and practice of refrigerating and ice-making, a very complete and detailed description of the apparatus made by the Frick Co.

AUTOMATIC ENGINES.—Frick & Co., Waynesboro, Pa. Paper; 6×9 ins.; pp. 56; illustrated.

This firm makes an automatic high-speed engine, which was redesigned in 1894, and is now offered for electric lighting and other service. The catalogue illustrates the engine in detail and shows a variety of forms, including compound engines.

GAS ENGINES.—The Backus Water Motor Co., Newark, N. J. Paper; 6×4 ins.; pp. 24; illustrated.

This catalogue illustrates a number of styles of gas and gasoline engines, ranging from 1 to 100 HP. The gas consumption of a 17½-HP. engine is said to have been less than 17 cu. ft. per hour per brake HP., or less than 15 cu. ft. per hour per I. HP.

CORLISS ENGINES.—Frick & Co., Waynesboro, Pa. Paper; 6×9 ins.; pp. 101; illustrated.

This catalogue describes and illustrates with considerable detail the "Eclipse" Corliss engine in various forms, including compound and vertical engines. Several tables of engine constants, average pressures, etc., useful to steam engineers, are also given.

COLD SAW CUTTING-OFF MACHINES.—Newton Machine Tool Works, Philadelphia, Pa. Catalogue No. 31. Paper; 6×9 ins.; pp. 32; illustrated.

Cold-sawing machines have been a leading specialty of this establishment for many years. A number of new patents were taken out in 1894 and 1895. The catalogue illustrates a great variety of forms.

RENO RAPID TRANSIT SYSTEM.—J. W. Reno, Mills Building, New York. Paper, 4×8 ins.; pp. 24; illustrated.

This pamphlet describes the inventor's proposed system of double-track, rectangular tunnels. The system has been described in our columns. A double-deck viaduct and the Reno inclined elevator for passengers are also shown.

DIRECT HEAT DRYERS.—The F. D. Cummer Co., Cleveland, O. Paper; 9×6 ins.; pp. 30; illustrated.

This is a descriptive catalogue of the company's direct-heat system for tunnels or dry-rooms, this system being used for crude or finished materials which will not stand being dried in the company's revolving dryers. The same method of heating is employed in both systems, and the air can be furnished at any desired temperature from 150° to 450°.

MACHINE TOOLS AND SMALL TOOLS.—The Brown & Sharpe Mfg. Co., and Darling, Brown & Sharpe, Providence, R. I. Paper; 3¾×5⅞ ins.; pp. 366 and 164.

The present edition of this well-known catalogue has been enlarged considerably over the earlier editions. It is divided into two sections: Machine Tools, 164 pages, and Small Tools, 366 pages. A number of new tables have been added, making it especially valuable to the workman as a book of reference.

STEAM HEATING.—Paul Steam System Co., 10 Federal St., Boston, Mass., and Western Paul Steam System Co., 218 La Salle St., Chicago, Ill. Paper, 6⅛×3⅝ ins.; pp. 12.

This little pamphlet briefly describes the Paul system of utilizing exhaust steam for heating purposes, which may be applied to "one-pipe" or "two-pipe" plants. The special feature is the removal of air from the radiators, which is effected by an air-exhausting apparatus connected by piping with each radiator or steam coil.

ENGINES APPLIED TO ROLLING MILLS.—Philadelphia Engineering Works, Limited. Catalogue N. Paper; 6×9 ins.; pp. 13; illustrated.

This catalogue is devoted chiefly to a discussion of the relative economy of compound-condensing over single-cylinder engines for rolling mill practice, in which the loads vary through a great range. In the compound engines built by these works the ratio of cylinder volumes is only 2¼ to 1, whereas 3½ or 4 to 1 is common in ordinary practice.

STEEL SECTIONS.—Dorman, Long & Co., Limited, Middlesborough, England. 12mo; pp. 182.

This catalogue shows the different sections of steel manufactured by the above firm, with diagrams, full dimensions, weights, moments, etc. While the majority of these sections are familiar to our readers, there are a number especially pertaining to shipbuilding that will be of interest. Trough decking, or solid floor construction for railway bridges, is very fully illustrated. Such floors are much more extensively used abroad than in this country.

TURRET LATHES AND TOOL GRINDING MACHINES.—Gisholt Machine Co., Madison, Wis. Paper; 6×9 ins.; pp. 44.

The Gisholt turret lathe was one of the novelties in machine tools which attracted great attention at the Columbian Exposition. It has now a well-established reputation, and a large number of varieties are made in sizes swinging from 13 to 50 ins. The catalogue illustrates a few of these types, with sketches of the character of work done by them, together with a universal tool grinding machine, recently introduced by the company.

LIGHT CARS.—Sheffield Car Co., Three Rivers, Mich. Paper; 6×9 ins.; pp. 96; illustrated.

This is an illustrated catalogue of the various styles of track velocipedes, hand cars, push cars, dump cars, street car trucks, coke and ore tubs, etc., manufactured by this company. Hand cars may be fitted with all-steel wheels or wood-center wheels, the latter being specially for roads using a track circuit for signals. Among other specialties are a weed cutting car

the Sheffield stand-pipe for supplying locomotive tanks, and the Dalley automatic cut-out switch operating a derail in the sidetrack.

HOISTING PLANT AND CONTRACTORS' SUPPLIES.—The John F. Byers Machine Co., Ravenna, O. Paper; 8 × 10½ ins.; pp. 55; illustrated.

This is an illustrated catalogue and price list of hoisting engines and boilers, hand hoists, power elevators for construction work, derricks and derrick fittings, etc. The steam hoisting plants have vertical boilers, vertical inverted engines, are fitted with Mr. Byers' friction clutch, and have from one to four drums and as many as eight spools. The company also supplies wire rope, tackle blocks, wheelbarrows and general contractors' supplies.

MANGANESE STEEL FOR CRUSHERS, ETC.—The Taylor Iron & Steel Co., High Bridge, N. J. Pamphlet; pp. 40.

This steel is especially adapted for the wearing parts of crushers, stamp mills, mine car wheels and mine rollers, bucket knives for dredges, picks for road-rollers, etc. It is made under the patents of Robert and R. A. Hadfield, of Sheffield, England, the Taylor Co. having the sole right to manufacture in the United States. The catalogue gives dimensions and form of wearing plates, etc., records as to use and comparative advantages over chilled iron. A valuable paper by Mr. H. M. Howe on this subject was published in our issue of June 20, 1891.

CONSTRUCTION NEWS.

CONDENSED LIST OF CONTRACTS PENDING WITH DATE OF OPENING BIDS.

Bids to be opened.	Work.	Place.	See Eng. News.
Nov. 1.	Plans school building,	Pittsburg, Pa.	Aug. 8
Nov. 1.	Plans for school building,	Pittsburg, Pa.	Sept. 26
Nov. 1.	Dike work,	Philadelphia, Pa.	Oct. 3
	Advertised, Eng. News, Oct. 3 to 24.		
Nov. 1.	County jail,	Detroit, Mich.	Oct. 10
Nov. 1.	Repaving,	Brooklyn, N. Y.	Oct. 24
Nov. 1.	Bridge,	Meridian, Miss.	Oct. 24
Nov. 1.	Sewer,	Buffalo, N. Y.	Oct. 24
Nov. 1.	Sewer,	Richmond, Ind.	Oct. 24
Nov. 1.	Macadam road,	Vernon, Conn.	Oct. 24
Nov. 1.	Paving,	Youngstown, Pa.	Oct. 24
Nov. 1.	Plans for school building,	Pittsburg, Pa.	Oct. 24
Nov. 1.	Public building work,	Milwaukee, Wis.	Oct. 31
Nov. 1.	Lowering sewer,	Niagara Falls, N. Y.	Oct. 31
Nov. 2.	Bridge superstructure,	Cincinnati, O.	Oct. 24
Nov. 2.	Macadam road,	Baltic, Conn.	Oct. 24
Nov. 2.	Macadam road,	Waterbury, Conn.	Oct. 24
	Advertised, Eng. News, Oct. 24.		
Nov. 2.	Road,	Tipton, Ind.	Oct. 24
Nov. 2.	Macadamizing,	Glastonbury, Conn.	Oct. 31
Nov. 2.	Electric light cables,	Chicago, Ill.	Oct. 31
Nov. 4.	Court house,	Morgantown, Ga.	Oct. 3
Nov. 4.	Iron bridge,	New Orleans, La.	Oct. 17
Nov. 4.	Iron drawbridge,	Houston, Tex.	Oct. 17
Nov. 4.	Steam boilers,	Newport, Ky.	Oct. 17
Nov. 4.	Sewers,	Toledo, O.	Oct. 24
Nov. 4.	Electric light plant,	Upper Alton, Ill.	Oct. 24
Nov. 4.	Water-works,	Chenoa, Ill.	Oct. 24
Nov. 4.	Water-works system,	Upper Alton, Ill.	Oct. 24
Nov. 4.	Sewer,	Mount Vernon, N. Y.	Oct. 24
Nov. 4.	Sewers,	Sandusky, O.	Oct. 24
Nov. 4.	Macadam paving,	Orange, N. J.	Oct. 24
Nov. 4.	Brick paving,	Huntingburg, Ind.	Oct. 24
Nov. 4.	Bitumen paving,	San Diego, Cal.	Oct. 24
Nov. 4.	Court house,	Mount Pleasant, Tex.	Oct. 24
Nov. 4.	Library building work,	Chicago, Ill.	Oct. 31
Nov. 4.	Additions to 2 school bldgs.,	Dunkirk, N. Y.	Oct. 31
Nov. 4.	Fire engine house,	Philadelphia, Pa.	Oct. 31
Nov. 4.	Jail,	New Castle, Ind.	Oct. 31
Nov. 4.	Pier at	Marcus Hook, Pa.	Oct. 31
Nov. 4.	Belgian block paving,	Jersey City, N. J.	Oct. 31
Nov. 4.	Intake pipe,	Albany, N. Y.	Oct. 31
Nov. 4.	Granite block paving,	New York, N. Y.	Oct. 31
Nov. 4.	Paving,	Albany, N. Y.	Oct. 31
Nov. 4.	Macadam road,	Trumbull, Conn.	Oct. 31
Nov. 4.	Sewers,	New York, N. Y.	Oct. 31
Nov. 4.	Sewer,	Binghamton, N. Y.	Oct. 31
Nov. 4.	Sewer,	Lincoln, Ill.	Oct. 31
Nov. 4.	School building,	Baltimore, Md.	Oct. 24
Nov. 5.	Pile bridges,	Allison, Ia.	Sept. 26
Nov. 5.	Brick court house,	Forsyth, Ga.	Oct. 10
Nov. 5.	Plans w.-wks., sewers, etc.,	Eufaula, Ala.	Oct. 17
Nov. 5.	Iron bridge,	Greenfield, Mo.	Oct. 24
Nov. 5.	Pipe sewers,	Dunkirk, N. Y.	Oct. 24
Nov. 5.	Sewers,	New Brighton, N. Y.	Oct. 24
Nov. 5.	Stone arch bridge,	Dunkirk, N. Y.	Oct. 31
Nov. 5.	Brick sewer,	Morgan Park, Ill.	Oct. 31
Nov. 5.	Artificial lake,	St. Louis, Mo.	Oct. 31
Nov. 5.	Sewers,	Springfield, Mo.	Oct. 31
Nov. 6.	Electric light franchise,	Arcanum, O.	Oct. 24
Nov. 6.	School building,	Providence, R. I.	Oct. 24
Nov. 6.	Tunnel sewer,	Waterbury, Conn.	Oct. 17
	Advertised, Eng. News, Oct. 17 to 31.		
Nov. 6.	Roads & concrete walks,	Columbus, O.	Oct. 31
Nov. 6.	Power,	Webb City, Mo.	Oct. 31
Nov. 6.	Sidewalks,	Norwalk, O.	Oct. 31
Nov. 6.	Paving,	Chicago, Ill.	Oct. 31
Nov. 6.	Water-works franchise,	Berlin, Wis.	Oct. 31
Nov. 6.	Electric ry. franchose,	Webb City, Mo.	Oct. 31
Nov. 7.	Paving (2 contracts),	Brooklyn, N. Y.	Oct. 31
Nov. 7.	Wooden bridge,	Chapin, Ill.	Oct. 31
Nov. 7.	Paving bonds,	Houston, Tex.	Oct. 31
Nov. 7.	Cement sidewalks,	Palmyra, N. J.	Oct. 31
Nov. 7.	Water-works system,	Lockport, Ill.	Oct. 24
	Advertised, Eng News, Oct. 24 and 31.		
Nov. 8.	Mud dredging (100,000 cu.yds.),	New York.	Oct. 24
Nov. 9.	Iron or steel bridge,	Iola, Kan.	Oct. 24
Nov. 8.	Electric light bonds ($15,000),	London, O.	Oct. 10
Nov. 8.	Ventilating,	Baltimore, Md.	Oct. 31
Nov. 9.	Steel trestle bridge,	Ventura, Cal.	Oct. 24
	Advertised, Eng. News, Oct. 24.		
Nov. 9.	Sewers,	Norwood, O.	Oct. 24
Nov. 9.	Lead pipe,	Syracuse, N. Y.	Oct. 31
Nov. 9.	Bridge (60 ft. long),	Jacksonville, Ill.	Oct. 31
Nov. 10.	Deep well,	Ames, Ia.	Oct. 31
	Advertised, Eng. News, Oct. 31.		
Nov. 11.	Street lighting,	Springfield, Ill.	Oct. 17
Nov. 11.	Electric lighting,	Union Springs, Ala.	Oct. 17
Nov. 11.	Paving bonds,	Youngstown, O.	Oct. 17
Nov. 11.	Sewers,	Toledo, O.	Oct. 24
Nov. 11.	County jail,	Port Lavacu, Tex.	Oct. 24
Nov. 11.	Pipe sewers,	South Bend, Ind.	Oct. 24
Nov. 11.	Brick paving,	South Bend, Ind.	Oct. 24
Nov. 11.	Macadam road,	West Milford, N. J.	Oct. 31
Nov. 11.	Boiler house, etc.,	Atchison, Kan.	Oct. 31
Nov. 11.	Bonds ($1,000,000),	Duluth, Minn.	Oct. 31
Nov. 11.	Furniture, etc.,	Fairfax, Va.	Oct. 31
	Advertised, Eng. News, Oct. 31 and Nov. 7.		
Nov. 11.	Electrical equipment,	Brooklyn, N. Y.	Oct. 31
Nov. 11.	Pipe sewer,	Bloomfield, N. J.	Oct. 31
	Advertised, Eng. News, Oct. 31 and Nov. 7.		
Nov. 12.	Swing bridge,	Hamilton, O.	Oct. 24
Nov. 12.	Pipe sewers,	Buffalo, N. Y.	Oct. 31
Nov. 12.	Sewers,	New York, N. Y.	Oct. 31
Nov. 14.	Elevator,	Scranton, Pa.	Oct. 31
	Advertised, Eng. News, Oct. 31 and Nov. 7.		
Nov. 14.	Iron bridge,	New Orleans, La.	Oct. 31
Nov. 14.	Street railway franchise,	New York.	Oct. 31
Nov. 14.	Water-works system,	St. Mary's, O.	Oct. 31
	Advertised, Eng. News, Oct. 31 and Nov. 7.		
Nov. 14.	Brick and pipe sewers,	Buffalo, N. Y.	Oct. 31
Nov. 15.	Swing bridge,	Abbeville, La.	Oct. 10
	Advertised, Eng. News, Oct. 10 to 24.		
Nov. 15.	Plans exposition bldgs.,	Nashville, Tenn.	Oct. 17
Nov. 15.	Sewer system,	Champaign, Ill.	Oct. 17
	Advertised, Eng. News, Oct. 17 and 24.		
Nov. 15.	Water-works system,	Honey Brook, Pa.	Oct. 24
Nov. 16.	Rebuilding bridge,	Boise City, Idaho.	Oct. 31
Nov. 16.	Electric lighting,	Wilkinsburg, Pa.	Oct. 31
Nov. 18.	Powder (580,700 lbs.),	Washington, D. C.	Oct. 24
Nov. 18.	County court house,	Galveston, Tex.	Oct. 31
Nov. 18.	Electric lighting,	Rome, N. Y.	Oct. 31
Nov. 18.	Water bonds,	Winton Place, O.	Oct. 31
Nov. 19.	State capitol,	Olympia, Wash.	Sept. 12
	Advertised, Eng. News, Sept. 12 to Oct. 31.		
Nov. 20.	Drainage canal work,	Chicago, Ill.	Sept. 26
	Advertised, Eng. News, Sept. 26 to Nov. 14.		
Nov. 20.	Steel bridge spans (3),	Mobile, Ala.	Oct. 24
	Advertised, Eng. News, Oct. 24 to Nov. 7.		
Nov. 20.	Macadam road (6 miles),	Woodbury, N. J.	Oct. 24
	Advertised, Eng. News, Oct. 24.		
Nov. 21.	College building,	Austin, Tex.	Oct. 31
Nov. 22.	Brick paving,	Marietta, O.	Oct. 31
Nov. 26.	Sewers,	Cincinnati, O.	Oct. 31
Nov. 27.	Granite pedestal,	Washington, D. C.	Oct. 31
Nov. 27.	Stone paving,	Cleveland, O.	Oct. 31
Dec. 2.	Sewers (22 miles),	Mobile, Ala.	Sept. 19
	Advertised, Eng. News, Aug. 29 to Oct. 24		
Dec. 10.	Garbage disposal,	New York, N. Y.	Oct. 31
Dec. 17.	Steel rails (4,000 tons),	Ottawa, Ont.	Oct. 24
Dec. 19.	Boiler house, etc.,	Los Angeles, Cal.	Oct. 31
Jan. 7.	Street ry. franchise,	New Orleans, La.	Oct. 17

RAILWAYS.

East of Chicago.

BALTIMORE & OHIO.—Contracts have just been awarded for important railway terminal improvements at St. George, Staten Island, which indicate that it is the intention of this company to make that point its principal New York terminal for both freight and passengers. Calvin McLean, 416 Broadway, New York, has been awarded the contract for the construction of a large passenger terminal and ferry house just south of the present ferry-house at St. George. The new structure will cost in the neighborhood of $150,000. It will be two stories high, and will be chiefly of iron. Mr. McLean has also contracted to build a new terminal station and ferry-house at Tottenville, from which point the Staten Island Rapid Transit Co. operates a ferry to Perth Amboy, N. J. In addition, contracts have been made to double-track the Perth Amboy division of the road.

BANGOR & AROOSTOOK.—Work on the Ashland branch is progressing rapidly, and 14 miles of track have already been laid to St. Croix Lake. The work of ballasting is being pushed from Ashland Junction toward Ashland, and four miles have already been completed. The stations, freight houses, etc., at Ashland Junction, Smyrna Mills, Masardis and Ashland are under construction. Ch. Engr., Moses Burpee, Houlton, Me.

BOSTON & MAINE.—Press reports state that this company is making a survey for an extension in the Pemmegewassett Valley of a branch of its system to White House Mill, in Lincoln, a distance of five or six miles. This branch will extend into Franconia Notch, and is intended to subserve the lumber interests. Ch. Engr., H. Bissell, Boston, Mass.

CENTRAL VERMONT.—A press report states that an extension from Montville to Palmertown, Conn., is contemplated by this road.

CINCINNATI, JACKSON & MACKINAW.—A press report states that the extension from Addison to Jackson will be completed within 90 days. The right of way has been secured for almost the entire distance of 17½ miles. Entrance to Jackson will be made over the tracks of the Lake Shore & Michigan Southern Ry.

CHICAGO, LAKE SHORE & EASTERN.—W. G. Brimson, Pres., 1039 The Rookery, Chicago, writes us that surveys have been completed, right of way secured and capital for construction all provided. The road is 15 miles in projected length, and extends from South Chicago through the towns of Hammond, Roby and Whiting to Clarke Junction. The following contracts have been let: Grading, Hiero B. Herr & Co., Chicago; masonry, Morris & Wait, St. Paul; drawbridge, Edgemoor Bridge Works, Del. Ch. Engr., C. E. Dearborn, South Chicago, Ill.

EMPORIUM & MOUNT JEWETT.—Incorporated in Pennsylvania Oct. 28 to build a railway 17 miles in length from a point on the Emporium & Rich Valley road to the confluence of Wild Cat Run and Marvin Creek, in McKeen county; capital stock, $200,000; Pres., Geo. J. Wolf, Bradford, Pa.; directors, Geo. J. Wolf, Jas. George, H. A. Jackson, Melvin G. Raub, Chas. V. Dennis and A. G. McComb, all of Bradford.

ESSINGTON & CHESTER.—Incorporated in Pennsylvania Oct. 26 to build a railway from Essington to Chester, Pa., a distance of five miles; capital stock, $50,000, with $10,000 paid in; Pres., Wm. Simpson, Jr., Overbrook, Montgomery county, Pa.; directors, Wm. P. Simpson, Overbrook; Chas. R. Maguire, Philadelphia; Wm. H. Badger, Jr., Wayne; Charles C. Townsend, Philadelphia; John E. Thompson, St. Louis, and Joseph B. Townsend, Overbrook. Principal office, Overbrook, Pa.

LE ROY & NORTHERN.—This road is projected to connect several industrial works on the outskirts of Le Roy, N. Y., with the Erie, the New York Central and the Buffalo, Rochester & Pittsburg roads, all of which run through the place or near it. The entire length of the road will probably not exceed two miles, and it will be used for freight service exclusively.

NEW YORK CENTRAL.—A correspondent writes us as follows: The contract for the work between Beauharnois and Caughnawaga, Que., has been awarded by the St. Lawrence & Adirondack Ry. Co. to Cameron & Fitzpatrick. This work, which comprises 13 miles, will give the New York Central an independent line from New York city to within 15 miles of Montreal, in place of running for some 50 or 60 miles on the Grand Trunk Ry., and will be finished by July 1, 1896. The St. L. & A. Ry. has bought the Beauharnois Junction Ry. from the Grand Trunk, and having almost completed a three-mile connection, joining it to the main line, near this town, will run on it to Beauharnois, and, as mentioned above, is about beginning construction from there to the Canadian Pacific bridge at Caughnawaga. Cameron & Fitzpatrick also built the three-mile connection, and will lay track on it in a few days. Dr. W. Seward Webb, of New York, is President, and R. W. Leonard is Chief Engineer of the St. L. & A. Ry., with offices at Beauharnois, Que.

PORT HURON & LEXINGTON.—According to press reports an energetic attempt is being made to revive the project for the construction of this railway from Port Huron to Lexington, Mich. Edgar H. Brennan, of Toledo, O., is the principal promoter of the project.

QUEEN ANNE'S.—The work of grading the first section from Queenstown to Denton, 23 miles, is being pushed by W. C. Merritt, contractor, and several miles are already finished. The route of the second section, from Denton to Lewes, has not been selected. Two lines have been surveyed, one via Adamsville, Greenwood, Ellendale and Milton, the other via Smithville, Bridgeville, Georgetown and Milton. It is expected that the entire line will be ready for operation by Nov. 1, 1896. Terminal buildings, wharves and piers are now under construction by Sanford & Brooks at Queenstown, and will be completed by Dec. 1. The terminal arrangements at Lewes, where the corporation owns 500 ft. of water front, will include a long pier for ocean steamers. Ch. Engr., I. W. Troxell, Baltimore, Md.

RACKET RIVER.—This road extends from Tupper Lake to Axton, at which place it connects with the Long Lake road. The combined length of the two lines from Tupper Lake to Long Lake will be about 20 miles. In our issue of Oct. 24 it was incorrectly stated that the Racket River road was to run from Potsdam to Colton, with a branch to Parrishville. The latter is a separate project, which we understand is being pushed by the New York Central.

TOLEDO, ANN ARBOR & NORTH MICHIGAN.—The grading for the short line of this road, between Ithaca and Alma, Mich., was completed Oct. 18, and the laying of ties and rails has begun. The exact site for the new union depot at Alma has not been fully decided upon as yet by the directors, but they expect to have all of the changes completed by Jan. 1. At the meeting of the directors held in New York, G. W. Quintard, of the Quintard Iron Works, was elected a vice-president.

ULSTER & DELAWARE.—This road is to extend from Kingston, N. Y., to Kingston Point on the Hudson River, where connection will be made with the Albany boats, thus providing an easy means of reaching the Catskills from New York. A large amount of piling must be done, and the contract for this work, according to press reports, has been let to Thomas Sturgeon. No other contracts have yet been awarded, but it is said the extension will be completed by the beginning of the summer of 1896. Pres., S. B. Coykendall, Rondout, N. Y.

WESTERN NEW YORK & PENNSYLVANIA.—It is reported that this company contemplates the construction of extensive freight yards on the outskirts of Buffalo, having purchased a large tract of land for that purpose at Ebenezer. These yards will be completely equipped, and it is said will be second to none in the United States.

WHEELING & LAKE ERIE.—Press reports state that this road will be built from Lorain, O., to Lindale, on the Belt Line Ry., in the interests of the Johnson Steel Co., of the former place. The object is to gain an independent outlet to Cleveland for the Johnson steel rails. Surveys have been made, and it is understood that the road will soon be started.

Southern.

ABERDEEN & WEST END.—It is expected that this road will be completed to Troy, N. C., 42 miles, by Dec. 1. Pres., J. R. Page, Aberdeen, N. C.

FLORIDA CENTRAL & PENINSULAR.—A press report states that work will soon begin on the extension from Starke, Fla., to Deadman's Bay. The road is complete as far as Alachua, but nothing has been done upon it for several months. When work does begin the road will be extended as rapidly as possible to the phosphate belt. This will give the Florida Central & Peninsular another feeder from the phosphate fields. The new road will probably cross the Plant system several miles north of Wade. Another project is the extension of this road from Arredondo to Lexington, which is to be built at once by B. Arentz & Co., of Ocala. This road would give a direct route from Gainesville to the phosphate fields, and place it in a position to command the trade of that section. The line is being surveyed by County Surveyor Patton, of Gainesville. Ch. Engr., B. Burwell, Jr., Jacksonville, Fla.

GEORGIA MIDLAND & GULF.—A press report from Atlanta, Ga., states that entrance into that city is to be obtained for the above road, by an extension from McDonough, its present northern terminus. The right of way has been secured to East Lake, within a few miles of Atlanta, and surveys are nearly completed. The road is now in the hands of a receiver, and is to be sold in the near future. The court passed an order that it should be improved in order to bring a good price when put up for sale. One of the chief improvements decided upon was the extension of the road to Atlanta.

HENDERSONVILLE & BREVARD.—This road was opened for regular freight and passenger traffic on Oct. 25. The length of the road is 21½ miles. It connects at Hendersonville with the Southern Ry. Pres., A. E. Boardman.

JACKSONVILLE, ST. AUGUSTINE & INDIAN RIVER.—Louis McLain, of West Palm Beach, Fla., contractor in charge of construction work on the 97-

mile extension of this road from West Palm Beach to Biscayne Bay, reports that rapid progress is now being made. Surveys are complete, capital for construction is all secured and contracts are let. The new road will touch the towns of Lantana, Lenton, Lemon City and Miami. Grading is now complete to Lemon City and nearly so to the terminus. Bridging is well advanced, and tracklaying going forward at the rate of ¾ mile per day, 10 miles having already been completed. It is expected that the line will be completed to Biscayne Bay by Feb. 1, 1896. Pres., H. M. Flagler, 29 Broadway, New York; Ch. Engr., E. B. Carter, West Palm Beach.

KOON'S RUN & BRIDGEPORT.—J. M. Shina, of Adamsville, W. Va., writes us that this road is projected to extend from Bryan, a point on the Monongahela River road, via Adamsville, to Bridgeport, on the Baltimore & Ohio, a distance of 12 miles. At a recent meeting of the incorporators 10% of the subscribed capital was paid in and surveys were ordered. The road will probably be built within the limit of time required by the West Virginia statute, which prescribes partial construction within three years and completion within ten years. Pres., J. N. Wilkinson, Bridgeport, W. Va.

OHIO & KENTUCKY.—According to a press report, this company is planning to build a railway from a point on the Lexington & Eastern Ry. near its terminus in Breathitt county, Ky., 90 miles to Walnut Grove, in Morgan county, thus making an outlet for the rich timber and coal lands of eastern Kentucky. From this section products will have an almost direct line to Cincinnati and the North, via the Lexington & Eastern Ry. to Lexington. Pres., Wm. De L. Walbridge, 1 Broadway, New York.

PADUCAH, TENNESSEE & ALABAMA.—The recent sale of this road to the St. Louis Trust Co., following closely the sale of the Tennessee Midland to the same corporation, is taken by the Southern press to indicate the prospective formation of a combination, including the Little Rock & Memphis and roads extending north and east. When this shall have been accomplished, a considerable amount of extension work is to be undertaken. The Paducah, Tennessee & Alabama is to build south to Birmingham, the Little Rock & Memphis is to be pushed into Texas and Indian Territory, and short extensions are to be made to various existing lines.

SANFORD, LILLINGTON & EASTERN.—J. D. Bonshall, Raleigh, N. C., informs us that the right of way has been entirely secured, and preliminary survey made. About one-half the necessary capital for construction has been subscribed. The termini of the road are Sanford and Lillington, N. C., 25 miles apart. The route lies through a country favorable to railway building, and one containing large resources in pine timber.

Northwest.

ALBERTA TERRITORY, CANADA.—A press report from Winnipeg states that Parliament will be asked to incorporate a company to build a railway from Hudson Bay to Calgary, with a branch line to Edmonton.

CENTRALIA & CHESTER.—G. W. Bartlett writes us that surveys for the Salem branch have not yet been completed. A corps of engineers under H. W. Schmidt is working from Salem toward Centralia, Ill.

CHICAGO & LAKE SUPERIOR.—The work of grading is progressing rapidly and rails will be laid soon, the ties and steel being already on the ground. The depot grounds at Cambridge, Wis., have been selected. Thos. Appleby & Co., of Chicago, are the contractors. E. J. Foster, of Madison, Wis., is president of the road.

CHICAGO & NORTHWESTERN.—Press reports state that this company is to build a line from Redwood Falls, Minn., to Marshall. Redwood Falls is now at the terminus of a short spur, and the proposed extension will give that place a through line to Gettysburg, S. Dak. The survey for the double track improvements between Baraboo and Madison was completed on Oct. 19.

CHICAGO, MILWAUKEE & ST. PAUL.—According to press reports, an extension is soon to be built from Egan, S. Dak., to Ortonville, Minn., giving a direct route from Sioux Falls to Fargo.

GULF & MANITOBA.—John K. Brown, Pres., Jackson, Minn., writes us that the Jackson Southern division of this project, extending from Jackson to Ruthven, Ia., will be 35 miles in length. Nine miles have already been graded south from the crossing of the Burlington, Cedar Rapids & Northern toward Ruthven. Five miles north of this junction is under contract to be completed ready for traffic by Jan. 1. The right of way is secured to Jackson, nine miles further north. The entire 35 miles will be in operation by July 1, 1896. The contractors for the work are G. L. Hubbard & Co. Ch. Engr., A. C. Titus, Superior, Ia.

ILLINOIS CENTRAL.—The Chicago city council has passed the ordinance embodying the plans recently arranged by Mayor Swift and the Illinois Central officials, regarding the Lake Front Park improvements. The railway company agrees to depress its tracks, build a sea wall along the whole length of the park, fill in a large amount of ground, and grade the whole. In addition, it will build viaducts at several points over its right of way. These improvements will cost $1,250,000. In return the railway company will receive seven acres of valuable land. This is said to be an acceptable solution of the long-standing "lake front problem," and is looked upon favorably by Chicago business men.

MANITOWOC TERMINAL.—It was the original intention in connection with this project, to use the tracks of the Chicago, Milwaukee & St. Paul from Hilbert Junction to Neenah, Wis., but press reports state that no satisfactory arrangements having been made with that company, the new road will now branch off from Potter's Mills direct to Menasha. This will add considerably to the length of the line and will delay the completion of the road. It will be necessary to purchase a new right of way.

MARINETTE, TOMAHAWK & WESTERN.—It is reported that this road will be completed and ready for operation from Tomahawk to Harrison by Jan. 1. At the latter place connection will be made with the Chicago & Northwestern. Pres., W. H. Bradley, Milwaukee, Wis.

MARQUETTE & IRON RANGE.—Incorporated in Michigan Oct. 24; capital stock, $100,000. A press report from Marquette, Mich., states that this road will extend to that place from Champion, Mich., and that contracts have been let to Winston Bros., of Minneapolis. The distance is only 15 miles, but the cost of the line, including docks and terminals, will reach $2,000,000. This road will give Marquette a competing line to the iron mines, the Duluth, South Shore & Atlantic now having full control of the extensive iron traffic to this lake port. The Chicago, Milwaukee & St. Paul, whose present terminus is now at Champion, is stated to be the promoter of the project.

MINNEAPOLIS, NEW ULM & SOUTHWESTERN.—Contracts have been let to P. B. Winston, of Minneapolis, and C. J. Larson, of Winthrop, for the construction of the portion of this road extending from Winthrop to New Ulm, Minn., to be finished Aug. 1, 1896. It is expected that most of the grading will be completed this year.

MINNEAPLIS, ST. PAUL & ASHLAND.—Contracts have been closed with the Standard Construction Co. for the construction of the railway that is to connect Ashland with St. Paul and Minneapolis. Work has already begun, and it is hoped to complete 25 miles of the new road this fall, and have trains running into Ashland on the new road before Jan. 1. The rolling stock and steel have already been purchased, including ten heavy and ten light locomotives and 500 cars, so that the line will be thoroughly equipped at the start. The road will start at the head of Fish Creek, and run into the valley, tapping the Duluth, South Shore & Atlantic near Mason, and it is likely that the track will be leased to that company to give them a line into Ashland.

Southwest.

CLEAR CREEK, ARCADIA & GULF.—We are informed by the secretary of this company, at Arcadia, Tex., that the road is projected to extend from Clear Lake, Tex., through the towns of Dickenson, Arcadia, Liverpool and Bay City to Yoakum, an estimated distance of 105 miles. No active work has yet been done, the present organization being only a temporary one, but the road is on a solid basis and will be built.

DALLAS TERMINAL.—This company has made application to the railroad commissioners of Texas for permission to issue $500,000 in bonds, for the construction of 28 miles of railway and extensive freight and passenger terminal facilities at Dallas.

HOUSTON & TEXAS CENTRAL.—The extension of this line to the Calvert coal fields has been begun.

HUTCHINSON & SOUTHERN.—A press report from Wichita, Kan., is authority for the statement that this road, which now reaches from Hutchinson, Kan., to Cameron, will be extended to Pond Creek, Ind. T., and Guthrie, Okla., this winter, the necessary capital having already been secured. The contracts have not yet been let, but the receiver and officers of the road have just completed a survey, preliminary to the awarding of contracts and the securing of concessions. This line is an independent one, and has been made the subject of offers by the several systems that run into and through Hutchinson. Receiver, B. Roberts, Topeka, Kan.

KANSAS CITY, SHREVEPORT & GULF.—A press report states that arrangements have been made for beginning the construction of this road from Shreveport, La., south, and that trains will be running by Feb. 1. Pres., E. L. Martin, Shreveport, La. This is a portion of the Kansas City, Pittsburg & Gulf road, now being built from Kansas City to the Gulf of Mexico.

NEVADA & ELDORADO SPRINGS.—W. P. Cruce, of Eldorado Springs, Mo., writes us that surveys have been made, but that the construction work is still in abeyance. The road will be built between Nevada, Mo., and Eldorado Springs, a distance of 22 miles. Pres., H. McPherson, Boonville, Mo.; Ch. Engr., H. A. Woods, St. Louis, Mo.

NEW ORLEANS & WESTERN.—A. W. Swanitz, Gen. Man., New Orleans, writes us that the following progress has been made to date: Track laid on main line, six miles of single, three miles of double and 10 miles of terminal tracks; 31 of the proposed 80 warehouses have been completed; 1,200 ft. wharf has been built, also grain elevator and power house about 70% completed.

WACO & NORTHWESTERN.—Press reports state that the line from Ross to Waco, bringing the Texas Central into the latter place is now assured. It will probably be controlled by the Texas Central, although the Southern Pacific has had its representative on the ground looking over the proposed route. Permission has been obtained from the city council of Waco by the former road for the erection of depots, shops and roundhouses. It is expected that the line will be further extended from Waco to Headsville, the center of the coal, terra cotta and firebrick clay regions.

Rocky Mt. and Pacific.

ASTORIA & COLUMBIA RIVER.—We are informed that the construction of this long-projected railway to connect Astoria, Ore., with Portland has been commenced and is being pushed with vigor. At Portland connection may be had with five large railways. In a project undertaken some time ago, 16 miles of road was built towards Goble, 60 miles distant. This completed portion is to be utilized, and 16 miles in addition is now under contract. Pres., A. B. Hammond, Astoria, Ore.

CANYON CITY & CRIPPLE CREEK.—According to press reports there has been incorporated in Colorado a railway company which purposes to build between the points above named. The route proposed is much shorter than the Florence & Cripple Creek ronad. If operated in connection with the projected Denver & Colorado Southern, it would bring Canyon City to within 130 miles of Denver.

CHICAGO, BURLINGTON & QUINCY.—A press report states that this company will build an extension via Buffalo, Wyo., to the valley of the Big Horn River; also from Cheyenne north to Alliance, touching the Hartville mineral deposits, and a wide expanse of agricultural and grazing land.

CHICAGO & NORTHWESTERN.—According to a press report from Wyoming, an extension from Casper to South Pass is contemplated, which will tap the great Dupont soda lakes and other wide soda deposits, the agricultural, mineral and stock resources of the Sweetwater Valley; the rich placer and quartz gold fields of South Pass, Miners' Delight, Atlantic City and Lewiston, and, by a short branch line, the oil, farming, range, mineral and timber lands of the Lander Valley.

OAKLAND & STOCKTON.—Press reports from Oakland, Cal., are authority for the statement that an important road is to be built between the places above named, connecting with the San Francisco & San Joaquin Valley line at Stockton. The financial promoters of the project are said to be E. F. Adams, Thomas Prather and W. G. Henshaw, prominent business men of Oakland.

SAN FRANCISCO & SAN JOAQUIN VALLEY.—Work is progressing at various points on the line, surveying, grading and tracklaying being separately pushed by the several contractors. The contract for 1,000,000 ft. of redwood and 10,000 ft. of piling for bridging has been let to the Albion Lumber Co., and that for 70,000 ft. of Oregon pine to the Stockton Lumber Co.

SEATTLE, VAUGHN & OLYMPIA.—E. G. Edrington, Pres., 509 Baily Bldg., Seattle, Wash., writes us that surveys have not as yet been completed, and that ground will probably not be broken until after the rainy season. This enterprise is a combination railway and water navigation project, embracing a steamer line from Seattle to Colby, a standard gage road from Colby to Vaughn, 14 miles, and a second steamer line from the latter place to Olympia.

Foreign.

GUATEMALA.—A press report states that the Government of this country has signed contracts for the building of 112 miles of new railway lines, as follows: Escuintla to Barberena, 53 miles; Port Ocos to interior, 31 miles; Costa to Cuca, 28 miles. These new railways will open to commerce coffee and cattle lands of great richness.

MEXICO.—According to a press report from San Antonio, Tex., a railway is to be built from Ciudad Juarez, on the northern border, to the rich mines of the Sierra Madre, in the State of Chihuahua. J. F. Crosby, of El Paso, Tex., is chief promoter of the project, and has recently obtained from the Mexican Government the right of way and other concessions.

JAPAN.—It is reported from Yokohoma that $25,000,000 has been voted by the Japanese Government for the construction of a double track railway from Tokio to Kobe, a distance of 376 miles, touching the industrial centres, Yokohoma, Kyoto and Osaka. Official figures state that in March, 1895, there were in Japan 29 railway companies which had obtained concessions. The total length of line belonging to them was then 2,193 miles, of which, however, only 1,549 miles had been opened for traffic. The state railways are not very important, comprising only 580 miles of line completed, and 398 miles in course of construction, and for which funds have been voted. The total capital of the 29 companies is $89,643,000, and that of the Government lines is $56,554,000.

STREET AND ELECTRIC RAILWAYS.

MILFORD, MASS.—The Milford, Holliston & Framingham St. Ry. Co. has been incorporated, with a capital stock of $150,000, by G. A. Butman and W. B. Ferguson, of Malden, Mass.; C. W. Shippee, of Milford; H. E. Bullard and John W. Mahoney, of Holliston, and J. F. Whitney, of Ashland.

SHELBURNE FALLS, MASS.—The board of trade has voted to make surveys for an electric road to Colrain. A committee consisting of C. A. Marcy and J. C. Deane, of Colrain; H. Newell, of Shelburne, and A. C. Bray, of Buckland, has been appointed to consider the project.

NORWICH, CONN.—The Montville Electric Ry. Co. has been organized to construct a road between Norwich and New London. Pres., Walter Learned, of New London; Treas., William A. Tucker, of Boston, Mass.; Secy., E. P. Shaw, Jr., of Norwich; directors, Winthrop Coffin, of Boston, and Solomon Lucas, of Norwich.

BROOKLYN, N. Y.—Bids are asked by the trustees of the New York & Brooklyn Bridge until Nov. 11, according to reports, for switching and heating the cars by electricity. C. C. Martin, Ch. Engr., Brooklyn.

BUFFALO, N. Y.—The Buffalo Traction Co. has been incorporated to construct an electric railway, 66 miles in length, from Buffalo city line, at South Park, to Cheektowaga; capital stock, $3,000,000; directors, F. G. S. Miller, Joseph B. Mayer, Leonard B. Crocker, Washington Bullard, and Herbert P. Bissell, of Buffalo; Tom L. Johnson, of Lorain, O.; Richard Ladenburg, John E. Page and Louis Kahn, of New York.

NEW BRIGHTON N. Y.—The Staten Island Electric R. R. Co. has petitioned the village trustees for a franchise. Secy., W. E. Findley.

NEW YORK, N. Y.—Bids are asked until Nov. 14 for the purchase of a street railway franchise for extensions to the Third Ave. R. R. Ashbel P. Fitch, Comptroller, Stewart Bldg., New York.

CORRY, PA.—R. M. Seaver, Pres., Corry, writes us that the Corry City Electric Street Ry. Co. has recently been organized to build a road 22 miles long to Columbus, Beaver Dam, Elgin, Findlay's Lake, etc. The capital has been secured and the contracts for the construction will be awarded in the spring.

OLYPHANT, PA.—Mair, Lewis & Hodges, of New York, N. Y., have been awarded the contract for building an electric railway seven miles long up the east side of the Lackawanna River. A power house will probably be built in this city. J. H. Page, Inspector, of Susquehanna; R. M. Dudley, Supt. Mair, Lewis & Hodges; T. S. Page, Lemuel Amerman and H. H. Archer, of the Lackawanna Valley Transit Co., of Scranton, are interested.

SHAEFFERSTOWN, PA.—It is reported that the residents of this place have subscribed nearly $45,000 for the extension of the Reading & Womelsdorf Electric Ry. to this city. The estimated cost is $80,000, which would include the necessary equipment. The line is in operation to Womelsdorf, 14 miles west of Reading.

BALTIMORE, MD.—The Gunpowder Ry. Co. has been organized by James Young, James Gilmore, Chas. B. McClean, Wm. A. Smith and others to build an electric road from the eastern suburbs of the city to the Gunpowder River. The proposed road will be connected with the Baltimore, Middle River & Sparrow's Point Ry.

BRUNSWICK, GA.—Thomas V. Hall & Co., 712 Commercial Bldg., St. Louis, Mo., have been awarded the contract for constructing the Brunswick Electric St. Ry.

GEORGETOWN, KY.—C. H. Williams, of Cartersville, Ga., proposes to equip the Georgetown St. Ry. with electricity. Secy., W. Z. Thomson.

DAYTON, O.—It is stated that the Cincinnati, Hamil-

ton, Middletown & Dayton St. Ry. Co. is making final surveys for its proposed electric road, estimated to cost $1,000,000. It is undecided whether to make the road a single or double-track line. Two power houses will be erected. Pres., L. C. Weir, Pres. Adams Express Co., New York, N. Y.; S. M. Felton, Pres. Cincinnati Southern R. R. Co.; A. Hickenlooper, Pres. Cincinnati Gas Light & Coke Co., are interested. Engr., Horace Wood.

LORAIN, O.—Surveys have been made for an electric road from Elyria to Lorain, and from Lorain to North Amherst, estimated to cost $200,000. The James L. Maudin Co. has been granted the franchise by the council for this road.

ST. MARY'S, O.—The Lima & Piqua Electric St. R. R. Co. has been incorporated to build a road to Criderville, Wapakoneta, St. Mary's, New Bremen, Berlin, etc.; capital stock, $9,000. B. C. Faurot, D. W. Jay, D. Armstrong, Wm. H. Hartman and S. W. McFarland are interested.

XENIA, O.—J. Wayne Neff, Vice-Pres. and Man., Xenia, writes us that the right of way and the capital for construction have been secured, and surveys made, for the Rapid Transit Co.'s proposed electric road, 18 miles long, from Xenia to Springfield and Yellow Springs. The contracts for the construction will be awarded this fall or early in the spring. Pres., W. R. Baker; Secy., Marcus Shoup; John Little is a director.

HUNTINGTON, IND.—The Huntington, Columbia City & Ligonier Electric Ry. Co. has been granted a franchise in Huntington county, for its proposed road, which will be 40 miles long. The company was incorporated last month, with a capital stock of $50,000, by Valoroes Brown, W. F. McNaggy, Thos. R. Marshall and J. H. Ruch.

ALLEGAN, MICH.—It is stated that arrangements are being made for letting the contracts for the construction of the Saugatuck, Holland & Southeastern Electric Ry., from Allegan to the lake shore. F. A. Makin is interested.

BENTON HARBOR, MICH.—Wm. A. Baker, Pres., Coloma, Mich., writes us that surveys have been made for the Benton Harbor, Coloma & Paw Paw Lake Ry., 11 miles long. One-half of the capital for the construction has been subscribed, and $5,000 paid in. The road will be built from Coloma to Paw Paw this fall, and the balance next summer, the work being done by home capital and home labor. The line will be equipped with gasoline engines, but if they fail, the road will be changed to electricity. Nearly all the right of way has been secured.

SAGINAW, MICH.—It is stated that D. J. Kennedy, Akron, O., has been awarded the contract for grading the Rapid Transit Co.'s proposed electric road. Alderman A. C. McLean, of Saginaw, is interested.

LYONS, ILL.—The board of trustees has granted a franchise to the Ogden St. Ry. Co. Chas. H. Smith, Village Clk.

WATERLOO, IA.—J. H. Rafferty, of the Waterloo & Cedar Falls Rapid Transit Co., Waterloo, writes us that the right of way between the towns for the proposed electric road, 18 miles long, has been secured. The capital for the construction will be secured about Nov. 12, on which date the officers of the company will be elected.

EMPORIA, KAN.—J. O. Patterson, of Chicago, Ill., is interested in a projected electric road in this city.

WEBB CITY, MO.—Bids are asked until Nov. 6 for the purchase of an electric railway franchise; bond, $10,000. J. J. Funk, Mayor.

FORT SMITH, ARK.—The Fort Smith & Van Buren Light & Transit Co. has been incorporated to build an electric railway and an electric light plant in Sebastian and Crawford counties; capital stock, $200,000; incorporators, M. N. Beatty, H. C. Mechem, J. H. Clendenning and F. A. Youmans.

SACRAMENTO, CAL.—The construction of the Sacramento, Fair Oaks & Orangevale Electric R. R. is being discussed by the Chamber of Commerce. J. O. Coleman, W. S. Leake, R. I. Bentley, J. H. Roberts and Alvin J. Bruner are interested.

SAN RAFAEL, CAL.—Henry C. Campbell and Louis L. Jones, of the Tamalpais Land & Water Co., of San Rafael, and Sidney B. Cushing, of the San Rafael Electric Light Co., are interested in a proposed electric railway up Mount Tamalpais from Mill Valley. The road will be built up a grade of 8%, and no cogs will be used. Surveys were made some time ago by Gus D. Avery, Ch. Engr. Tamalpais Land & Water Co., San Rafael.

MONTREAL, QUE.—Edmund Bristol, a lawyer of Toronto, Ont., is interested in the Canadian Electric Ry. & Power Co.'s proposed road from Windsor, Ont., to Montreal, noted in our issue of last week.

ELECTRIC LIGHT AND POWER.

AUGUSTA, ME.—The Maine Electric & Water Power Co. has appointed N. R. Hisler, of Weeks' Mills; O. F. Sprowle, of China, Me., and Henry Cleary, of Jefferson, to determine the value of property for the proposed dam at Cooper's Mills, which is to be used in developing the water power of Sheepscot Lake. Work will probably be begun in the spring. The incorporators are C. P. Collins, of Bradford Centre, Pa.; J. H. Link, of Williamsport, Pa.; William Doe, of Duke Centre, Pa.; A. M. Card, of Alna, Me., and Henry Ingalls, of Wiscasset, Me. Engr., W. B. Getchell, of Augusta.

CONCORD, N. H.—It is stated that J. G. Batterson, Jr., has made a contract with the Concord Land & Water Power Co. to supply electricity both for light and power at the works of the New England Granite Co. Orders for motors have been placed, and the work of installation will be begun at once.

FLUSHING, N. Y.—It is stated that the board of trustees has instructed the light and power committee to advertise for bids for lighting Main St. and Broadway with arc lights.

FLUSHING, N. Y.—The Long Island Electric Light Co., of Jamaica, N. Y., has petitioned for a franchise in this city. Vice-Pres., R. R. Lawson; Ch. Engr., E. L. Croft, Jamaica. The Flushing Electric Light Co. has also petitioned for a franchise. Pres., David Master, Flushing.

JAMESTOWN, N. Y.—It is reported that the board of public works has recommended that the city install a 2,000-light multiphase alternator and a 50-light arc machine. John Conway and E. O. Jones, Committee.

LITTLE VALLEY, N. Y.—An election has been held to vote on the question of issuing $7,000 in bonds for an electric light plant.

ROCKVILLE CENTER, N. Y.—The Hempstead Light & Power Co. has applied to the village trustees for a franchise. The company proposes to erect a central plant and supply the villages of Lynbrook, Rockville Center, Milburn and Freeport with light and power. Arturo Garcia & Co., commission merchants, of New York, are interested.

ROME, N. Y.—Bids are asked until Nov. 18 for furnishing 150 arc lights for one to six years. John F. Atkinson, Chn. Com.; K. S. Putnam, Chamberlain.

PALMYRA, PA.—The question of erecting an electric light plant is being considered.

WILKINSBURG, PA.—Bids are asked until Nov. 16 for furnishing 65 arc lights. James G. Storer, Borough Clk.

NEWCASTLE, DEL.—It is stated that the council is considering the question of lighting the streets with electricity.

BALTIMORE, MD.—The mayor has proposed the construction of an electric light plant at Druid Hill Park, at an estimated cost of $20,000.

KEYSTONE, W. VA.—It is reported that the question of electric lights is being considered.

CHAPEL HILL, N. C.—The University of North Carolina will put in an arc light electric dynamo at once, in addition to the two incandescent dynamos now in use. Address President Winston, Chapel Hill, N. C.

CHARLOTTE, N. C.—Lawrence S. Holt and E. M. Holt will soon let contracts for two or more electric light plants, to be put in as a part of the equipment of new cotton mills they are building.

ATHENS, GA.—W. W. Turner, Cy. Clk., writes us that the city has bought the electric light plant now in operation in this city.

LAFAYETTE, LA.—A committee has been appointed to consider the advisability of constructing an electric light plant and water-works. John I. Bell, Secy. Council.

COLUMBIA, TENN.—It is reported that an electric light plant of 75 arc and 650 incandescent lights capacity is proposed.

NEWPORT, TENN.—The Newport Mills is about to put an electric light plant in its works, according to reports.

HENDERSON, KY.—John C. Thomason, Cy. Clk., writes us that the citizens will vote Nov. 5 on the question of owning and operating a municipal electric light plant.

RICHWOOD, O.—This place is about to vote on the question of issuing $7,000 in bonds for an electric light plant. Geo. K. Smith, of Columbus, O., is interested.

UNIONVILLE, O.—A vote will soon be taken on the question of issuing bonds for an electric light plant and water-works, according to reports.

ATLANTA, IND.—The Atlanta Steel & Tin Plate Co. proposes to put a 50-arc-light plant in its works, and wishes to correspond with electric companies. Gen. Man., Theo. D. Morgan.

CORUNNA, MICH.—The citizens have voted to issue $30,000 in bonds for an electric light plant and water-works.

MENOMINEE, MICH.—The Peshtigo Lumber Co. has purchased two dynamos of 1,000 incandescent light capacity. The plant will also be used for lighting the village of Peshtigo, Wis. Isaac Stephenson, of the Marinette (Wis.) Electric Light Co., is interested.

CHICAGO, ILL.—Bids are asked until Nov. 2 for furnishing 19,648 ft. of Day's kerite electric light cables and 1,800 ft. of cast iron conduit. O. D. Wetherill, Comptroller; D. J. Sweeney, Fire Marshal, City Hall.

CHICAGO, ILL.—The West Side park commissioners have voted to engage an engineer to prepare plans for an electric plant to light the entire park system, estimated to cost $50,000. Address Chas. J. Vopicka, Comr.

LINCOLN, ILL.—John St. Cerny, John A. Lutz, D. H. Harts and C. C. Reed are interested in a projected electric light plant for this city.

MANITO, ILL.—It is reported that an electric light plant is about to be erected at this place.

MOWEAQUA, ILL.—It is stated that the question of constructing an electric light plant is being considered. John H. Culver, of Decatur, Ill., and R. M. Stine and N. Francis, of Moweaqua, are interested.

NUNDA, ILL.—A franchise for an electric light plant has been granted.

MENASHA, WIS.—The Neenah & Menasha Gas & Electric Light Co. has made arrangements to begin the construction of its electric plant. Man., George Davis.

CENTERVILLE, IA.—J. P. Gribben, Cy. Clk., writes us that the city will vote Nov. 5 on the question of an electric light franchise.

DULUTH, MINN.—Bids are asked until Nov. 11 for the purchase of $1,000,000 of 4% electric light and water-works bonds. C. E. Richardson, Cy. Clk.

DULUTH, MINN.—Press reports state that by a deal just consummated at Duluth by O. H. Simmons, who has interested a large number of eastern capitalists, the consolidation of the Minnesota Canal Co., the Altamonte Canal Co., and the Jay Cook interests has been effected. The Cook interests own every foot of land for over five miles along the St. Louis River. This water power will be improved and electricity generated, giving a cheap power, and smelting of iron ore by electricity will begin. There is on the Mesaba and Vermillion ranges hundreds of thousands of tons of low-grade ore, which will never be used until a means is found to smelt it here at home. It is understood that Andrew Carnegie is interested in the new venture, and with him are associated many of the best-known iron men of the country. The new range road to be built by the Merrits is a part of the general plan.

PARK RAPIDS, MINN.—An electric light plant is to be put in next spring, according to reports.

PRESTON, MINN.—The citizens have voted in favor of an electric light plant and water-works.

YANKTON, S. DAK.—The construction of a new electric light plant is being considered.

DEL NORTE, COLO.—It is stated that this place will soon have an electric light plant.

DEXTER, MO.—This place has voted in favor of electric lights, according to reports.

ST. LOUIS, MO.—The Laclede Power Co., which has 1,000 miles of wire in the business district, proposes to extend the area, and for that reason the capital has been increased from $75,000 to $400,000. Pres., Henry C. Scott; Vice-Pres., Samuel M. Dodd. Pres. Missouri Electric Light & Power Co.; Secy., Edward V. Matlack; directors, Thos. E. Tutt, director of the Mississippi Trust Co.; S. W. Fordyce, Pres. Cotton Belt Ry. Co.; Thos. H. West, Pres. St. Louis Trust Co.

WEBB CITY, MO.—Bids are asked until Nov. 6 for furnishing power for electric lights. J. J. Funk, Mayor.

TEXAS CITY, TEX.—J. R. Truesdale, 208 Temple Bldg., St. Louis, is interested in a projected electric light and railway system in this city.

BEEVILLE, TEX.—Emil Buescher and Joseph Arnim, of Moulton, are reported as interested in a proposed electric light plant for this place.

MONMOUTH, ORE.—The board of city improvements, recently organized, is interested in a projected electric light plant and water-works, according to reports.

CHICO, CAL.—The city trustees are considering the question of constructing an electric light plant, according to reports.

SANTA CRUZ, CAL.—Surveys have been made for a water power plant, by which it is proposed to supply this city with 600 HP. Roebling & Sons, it is stated, will be awarded the contract for the wire. F. W. Swanton is interested.

NEW COMPANIES.—Union Power Co., Cleveland, O.; $50,000; J. Henry White, F. C. Phillips, Geo. C. Wing, Morris S. Towson, H. N. Chamberlain.

Lincoln Electric Light & Power Co., Lincoln, Neb.; John St. Cerny, John A. Lutz.

Dansville Gas & Electric Light Co., Dansville, N. Y.; $25,000; W. W. Cramer, Dansville.

Gouverneur Electric Light & Power Co., Gouverneur, N. Y.; A. L. McCrea, J. H. Abbott.

Wisconsin Power Co., Superior, Wis.; $100,000; to develop the surrounding water power; F. A. Ross, W. D. Dwyer, S. T. Norvell.

Philadelphia Electric Light & Water Co., Egg Harbor City, N. J.; Pres., Henry Keuhnle; Christian Mueller, Chas. Class, Geo. C. Cressy, Philadelphia, Pa.

Logan County Electric Light Co., Lincoln, Ill.; $20,000; John W. Lutz, Charles C. Reed, John St. Cerny, T. A. Reynolds, Adam Denger, D. H. Harts, R. H. Calns, John A. Lutz.

McGregor Electric Light & Power Co., McGregor, Ia.; $10,000; Pres. and Treas., Clark W. Thompson; Vice-Pres., Chas. F. Speed; Secy., Helmus W. Thompson, all of La Crosse, Wis.

Gray's Electric Ry. Supply Co., Saco, Me.; to manufacture rails, cars, apparatus for electric and other railways; $500,000, with $50 paid in; Robert Johnson, Boston, Mass.; James R. Powers, Boston.

Big Four Electric Co., Chicago, Ill.; $200,000; to manufacture electrical apparatus, devices and machinery, and to furnish light, heat and power; Henry D. Ames, William H. Brown, Louis K. Gillson.

Clear Lake Electric Power Co., Lakeport, Cal., $2,000,000, with $120,000 paid in; E. P. Clendenin, D. C. Rumsey, Lakeport; J. K. Fraser, Keysville; O. E. Moore, San Francisco; Richard Wylie, Napa.

Salt Lake & Ogden Gas & Electric Light Co., Salt Lake City, Utah; W. S. McCormick, P. L. Williams, George M. Scott, L. S. Hills, banker, Thomas G. Webber, of Zion's Co-operative Mercantile Institution.

Lafayette Engineering & Electric Works, Lafayette, Ind.; $60,000; to manufacture electrical and steam machinery; Charles B. Robertson, Henry T. Meigs, John C. Flathers, Edgar V. Burt, Samuel Moore, Lafayette, Ind.

Philadelphia Electric Storage Battery Renting Co., Camden, N. J.; $300,000, with $1,000 paid in; to manufacture storage batteries, dynamos, motors, etc.; Ebenezer Wood, Madison Rush, Philadelphia, Pa.; Wm. H. Casselman, Camden, N. J.

Chaquette Power Co., Bridgeport, Conn.; to compress air and supply the same for refrigerating purposes, for propelling locomotives, engines, cars, ships, boats, street cars and other vehicles, and for running engines, dynamos, motors and other machinery; $75,000; Ephraim Chaquette, Daniel Davenport, William O'Hara.

Fort Smith & Van Buren Light & Transit Co., Fort Smith, Ark.; $200,000, with $5,000 paid in; the company proposes to connect the two cities by an electric railway and to supply electric light; M. N. Beatty, H. C. Mechem, J. H. Clendenning, Ralph Mechem, F. A. Youmans.

BUILDINGS.

SPRINGFIELD, Mass.—Gardner, Payne & Gardner, Lyman St., Springfield, It is reported, have prepared plans for a cold storage building, 160 × 85 ft., to cost $40,000.

ALBANY, N. Y.—The capitol commissioners are considering plans for completing the state capitol building, and it is probable that at their next meeting they will decide to advertise for bids for the work. State Arch., I. G. Perry, Albany.

BUFFALO, N. Y.—The following bids have been received by the supervising architect at Washington, according to reports, for the stone and brick work of the basement and area walls for the U. S. public building in this city:

L. R. Fellows & Son, Concord, N. H., $84,370, Westerley red; time, 6 months.

Henry Rumrill, Jr., Buffalo, N. Y., $73,463, Moos-a-Bec red; time, 5 months.

J. J. Churchyard, Buffalo, N. Y., $77,811, Milford pink; $78,311, Moos-a-Bec; time, 200 working days.

L. L. Leach & Sons, Chicago, Ill., $73,200, Maine red granite; $67,860, Branford red; $69,970, Wisconsin; $71,890, Minnesota; time, 6 months.

Collingwood & Donaldson, Buffalo, N. Y., $84,576, Moos-a-Bec red; time, 150 working days.

J. E. & A. L. Pennock, Philadelphia, Pa., $75,887, Easton; time, 6 months.

Amberg Granite Co., $80,000, sample No. 1, Amberg granite; $87,537, No. 1 for step and platform and No. 2 Ashland; time, 130 working days.

G. Mamioli, Rockford, Ill., $84,344, Jonesboro red; time, 6 months.

Schmidt & Son., Buffalo, N. Y., $68,740, Moos-a-Bec; time, 6 months.

John Pierce, New York, $57,900, Jonesboro, Me., red; time, 125 working days.

Frank Baldwin, Washington, D. C., $72,257, Moos-a-Bec red; $78,918, red Westerley; $76,918, Milford pink; time, 6 months.——George A. Ricker, 910 D. S. Morgan Bldg., has prepared plans for a corrugated iron mill and elevator, 56 × 105 × 112 ft., for E. H. Husted & Co., 53-59 East Market St., at Elk and Prenatt Sts. The estimated cost is $50,000. Contracts have not yet been let.

DUNKIRK, N. Y.—Bids are asked until Nov. 4 for constructing additions to two school buildings. Arch., W. H. Archer, 85 West Eagle St., Buffalo; C. M. Reed, Secy. Bd. Education, Dunkirk.

NEW YORK, N. Y.—Plans have been filed by the New York Athletic Club for a nine-story brick building at Sixth Ave. and 59th St., to cost $490,000; Arch., W. A. Cable; and by Edward Kilpatrick, 50 West 67th St., for a 10-story brick hotel at 94th St. and Central Park West, to cost $175,000.

NEW YORK, N. Y.—D. O. Mills, of this city, has purchased a lot 75 × 100 ft. at Chrystie and Rivington Sts., and also a lot with 200 ft. front on Bleecker St. The buildings on these lots will be removed, and it is proposed to erect two large lodging houses. Arch., Ernest Flagg, 54 Broad St., New York.——The New York Chamber of Commerce building committee is considering different sites for an office building; Pres., Alex. E. Orr.——The American Society of Civil Engineers has purchased a lot 114 × 106 × 50 ft., at 218 and 220 West 57th St., on which it is proposed to erect a club house.——The supervising architect has received the following bids for the steel and iron work for the fourth to the tenth floors and roof, also steel columns above the third floor, and framing of iron stairs of the U. S. appraisers' warehouse in this city:

		Time.
Edgemoor Bridge Wks, Wilmington.	$439,000	335 days.
Michael Giblin, 134 W. 80th St., N.Y.	439,366	1 year.
Post & McCord, New York city.....	419,900	12 months
Jackson Arch. Iron Works, N. Y.....	435,000	9 "
N. J. Steel & Iron Co., Trenton, N. J.	463,564	1 year.

STAPLETON, N. Y.—Press reports state as follows: The contract for the Baltimore & Ohio R. R. passenger terminal and ferry-house at St. George, Staten Island, has been awarded to Colin McLean, 416 Broadway, New York, who is to begin work at once. The Staten Island Rapid Transit Co., controlled by the B. & O. R. R. Co., will begin operating trains from the new terminal next April. The company has already spent $137,000 in and about St. George on the bulkheads and substructure, and $150,000 more is to be spent on the terminal building. This building is to be two stories high, and to be principally of iron. It is to be a combination of a passenger terminal station and a ferry-house. A waiting room 50 × 75 ft. will take up a large part of the first floor. The second will be used for offices. There will be the usual train shed and all the other appurtenances of a first-class railway terminal and ferry-house. Mr. McLean has also been awarded the contract for a new terminal station and ferry-house at Tottenville, from which point the Staten Rapid Transit Co. operates a ferry to Perth Amboy, N. J. Contracts have also been made for double-tracking the Perth Amboy division of the road.

UTICA, N. Y.—It is stated that at the election to be held next week the proposition to build an academy to cost $125,000 will be voted upon.

PATERSON, N. J.—Plans are about completed for a new post office building, 150 × 75 ft., work on which will soon be begun. C. S. Kemper, Acting Supervising Arch., Washington, D. C.

McKEESPORT, PA.—It is reported that the Pennsylvania R. R. Co. has about decided to erect a passenger station in McKeesport and to run all the passenger trains on the P. V. & C. R. R. into the city. This it could do by making use of the bridge near Riverton, now used only for freight purposes.

PITTSBURG, PA.—The committee of the citizens' executive board of the Republican convention has engaged an architect to prepare plans for a hall 250 × 203 ft., with a seating capacity of 15,000 people.——Subscriptions are being secured towards the expense of constructing a new armory for the national guard. The building will cost $200,000, exclusive of the ironwork, which has been donated by Andrew Carnegie.

PHILADELPHIA, PA.—Bids are asked until Nov. 4 for erecting a fire engine house on Belmont Ave. Abraham M. Beitler, Dir. Dept. Pub. Safety.——J. Franklin Stuckert & Son have prepared plans for a 10-story office building, 140 × 40 ft., near the public buildings.

PHILADELPHIA, PA.—It is stated that the Philadelphia & Reading R. R. is making arrangements for the erection of two warehouses, which will occupy the site of the old depot and train sheds at Broad and Callowhill Sts. Bids are now being received for the work, and it is said that an actual start is soon to be made. The new buildings will be built from the grade of the proposed subway, and will be 10 stories high. At 19th and Callowhill Sts. a third warehouse, also of large size, is to be erected, also on the subway grade.

SCRANTON, PA.—Bids are asked until Nov. 14 for erecting an electric or hydraulic passenger elevator, etc., in the U. S. public building in this city, as stated in our advertising columns. Wm. Martin Aiken, Supervising Arch., Washington, D. C.

BALTIMORE, MD.—Bids are asked until Nov. 8 for ventilating the temporary court house at North and Lexington Sts. J. Theo. Oster, Inspector of Bldgs.

CUMBERLAND, MD.—The treasury department at Washington will purchase a site in this city Nov. 12 for a public building 140 × 130 ft.

WASHINGTON, D. C.—It is reported that the board of lighthouse engineers is preparing plans for three lighthouses, and will soon ask for bids for their construction. One will be a screw pile lighthouse.

HUNTINGTON, W. VA.—James B. Stewart, Supt., has received the following bids for erecting a court house for Cabell county:

L. W. Divilbiss, Carthage, Mo.	$95,840
Murry Bros., Wheeling, W. Va.	98,000
E. M. Long, Cadiz, O.	99,877
A. F. Withrow Lumber Co., Charleston, W. Va.	117,900
Chas. A. Moses, Chicago (awarded contract).....	95,850

CHARLOTTE, N. C.—The commissioners of Mecklenburg county have bought a site and will erect a brick and granite court house, to cost about $100,000, at Charlotte.

MACON, GA.—Geo. B. Moling, a banker of Columbus, O., is interested in the construction of a proposed hotel in this city, to cost $200,000.

SAVANNAH, GA.—The Aldermen propose to build a new police station, which will contain a large number of cells.

LOUISVILLE, KY.—H. Diel is preparing plans for an office building.

NASHVILLE, TENN.—W. M. Nixon, Secy. Prison Comrs., Chattanooga, Tenn., informs us that the following contracts were awarded Oct. 24 for constructing the state penitentiary: H. H. Squair, Rockwood, Tenn., brick and stonework at $208,000; T. J. Mooney, Nashville, plumbing, at $27,000; Nashville Machine Co., Nashville, heating and ventilating, at $9,357. The other bidders for the stonework were as follows: Adams & Schneider, Chattanooga; Chas. A. Moses, Chicago, Ill.; Neeley & Smith, Chattanooga; L. Hazen & Co., Cincinnati, O.; L. L. Leech & Son, Chicago, Ill. The following bid on portions of the work: Thos. Waters, Nashville; Geo. Moore & Sons, Nashville; Van Dorn Iron Works, Cleveland, O.; L. Schrieber & Son, Cincinnati, O.; Pauly Jail Building & Mfg. Co., St. Louis, Mo.; Champion Iron Works, Canton, O.; Snead & Co. Iron Works, Louisville, Ky.; Ross Mehan Foundry Co., Chattanooga; Neeley & Smith, Chattanooga; L. Dennedy, Nashville; John Oman, Nashville; East Tennessee Stone & Marble Co., Knoxville; J. T. DeJarnett, Nashville; Marlague & Co., Chattanooga; Empire Fire Proofing Co., Chicago; Parker-Russell Mining & Mfg. Co., St. Louis; General Electric Co., Metropolitan Construction Co., J. W. Braid, Nashville; Shea & Straley, Chattanooga; Casey & Hedges Mfg. Co., Chattanooga; Walsh & Widner, Chattanooga; Ryan & Shea, Nashville; T. S. Wilcox, Chattanooga; Phillips & Buttorff Mfg. Co.; H. H. Symmes, Louisville, Ky.; Nashville Roofing & Paving Co. The contracts for the electric work, boilers, engines and elevator have not yet been awarded.

ENGLISH, IND.—Oliver M. Marble, 804 Gath Bldg., Chicago, Ill., is reported as having prepared plans for a $100,000 court house and a $30,000 sheriff's residence.

GREENFIELD, IND.—Wing & Mahurin, Pixley Bldg., Fort Wayne, have prepared plans for a court house, 130 × 125 ft., to cost $125,000.

INDIANAPOLIS, IND.—McPherson & Bowman have prepared plans for a 14-story office building on Washington St., to cost about $500,000.

NEW CASTLE, IND.—Bids are asked until Nov. 4 for erecting a jail. F. T. Bleasdale, Town Clk.

CHICAGO, ILL.—Bids are asked until Nov. 4 for the brick, steel and terra-cotta work for the interior of the public library in Dearborn Park. Archs., Shepley, Rutan & Coolidge, Venetian Bldg., Chicago; W. B. Wickersham, Secy.——The board of west side park commissioners is considering the question of constructing a grand stand, 500 ft. long, to seat 6,000 people, in Garfield Park, at an estimated cost of $50,000.

CHICAGO, ILL.—The supervising architect at Washington, D. C., has received the following bids for a steam-heating plant for the temporary post office building in this city; item 1 being the amount; 2, omitting one boiler; 3, omitting certain radiation:

Bidder.	1.	2.	3.	Time, days.
C. H. Simmons, Chicago, Ill....	$24,990	$900	$890	60
John Davis Co., Chicago, Ill.....	26,450	1,000	950	...
Wells, Newton Quay Co., Chicago	28,800	1,511	937	60
Daniel Cary, New York city.....	32,956	800	2,698	90
Samuel I. Pope Co., Chicago, Ill.	24,261	1,100	1,250	115
Lynch & Woodward, Boston, Mass.	29,877	1,150	600	200
Kelm Bros. & Meritz, Chicago, Ill.	27,144	1,087	1,956	100
Robert Gordon, Chicago, Ill.....	22,700	1,075	1,045	40
The Bayley Heating Co., Milw'k'e	32,982	...	...	180
C.B. Kruse Heating Co., Milw'k'e	24,980	660	873	90
Chafer & Becker, Cleveland, O.	32,137	975	902	6 mos.

EVANSTON, ILL.—The Y. M. C. A. of this city proposes to erect a $125,000 building as soon as $75,000 has been subscribed. Secy., Wm. Boyd.

ALGONA, IA.—It is stated that an election will be held Nov. 5 to vote on the question of erecting a jail, plans for which have not yet been prepared. C. C. Chubb, Chn. Bd. Supervisors.

MILWAUKEE, WIS.—Bids are asked until Nov. 1 for the steel and iron framing of the roof, etc., of the U. S. public building in this city. Wm. Martin Aiken, Supervising Arch., Washington.——Chas. Kirchhoff, Jr., is preparing plans for a six-story music hall, 150 × 200 ft., to cost $350,000 for Uhlen Bros.

MINNEAPOLIS, MINN.—The board of education has decided to advertise for bids for erecting a new five-story school building, on Fremont Ave., the assembly hall of which is to have a seating capacity of 1,000. Arch., C. F. Struck.

ST. PAUL, MINN.—The city has under consideration the remodeling of the market house, consisting of lowering the first floor to the level of the streets, and subdividing the interior into stalls by wire netting. A 16-ft. arcade will run clear through the building in the center. The outside windows will also be cut down to street level, and double doors put in their places. Plans and specifications have been prepared by W. C. Merryman, 428 Endicott Building, and are now in the hands of the city clerk. The work will cost about $10,000 and it is hoped that it may be advertised at the next meeting of the council, and completed by Jan. 1.

ATCHISON, KAN.—Bids are asked until Nov. 11 for constructing a boiler house, smokestack, water tower, etc., for a soldiers' orphans' home in this city. Arch., C. Holland, Topeka; John Seaton, Pres. Bd. Pub. Wks., Topeka, Kan.

KANSAS CITY, KAN.—The executive committee of the board of trustees of the Kansas City University has decided upon plans for the buildings, estimated to cost $100,000. Contracts for the construction of the main building will be let at once. Pres., H. J. Heintz, Pittsburg, Pa.; Dr. J. W. May, Kansas City, and D. S. Stephens, Pittsburg, Pa., are interested.

ST. LOUIS, MO.—It is reported that B. F. Small, of Small & Co., Security Bldg., proposes to erect an 18-story building, to cost about $700,000.

ST. LOUIS, MO.—The committee investigating the partly-completed city hall, estimated to have cost the city $2,000,000, has about decided that the building will have to be reconstructed, according to reports.——B. Graham, Pres. Graham Paper Co., St. Louis, is to build a 13-story office building at Seventh and Pine Sts. Archs., Kirchner & Kirchner, St. Louis.

FORT WORTH, TEX.—It is stated that B. F. Yoakum, Gen. Man. Santa Fe Railway, proposes that Fort Worth shall have a union station, to cost $150,000, if property owners will raise $10,000. The new building will be located on the Santa Fe reservation, and will give Fort Worth two union depots. The Santa Fe, Houston & Texas Central and Rock Island Ry. companies are interested.

AUSTIN, TEX.—Bids are asked until Nov. 21 for extending the main building of St. Edwards College, Austin. Archs., N. J. Clayton & Co., 22d St. and Strand, Galveston, Tex.; Rev. P. P. Kleine, Pres., Austin.

GALVESTON, TEX.—Bids are asked until Nov. 18 for erecting a brick building at Clear Creek. Geo. H. Law, Clk. County Court.

GALVESTON, TEX.—Bids are asked by the county commissioners until Nov. 18 for constructing a court house to cost about $375,000, acording to reports.

LOS ANGELES, CAL.—Bids are asked until Dec. 10 for constructing a boiler house at the county hospital. Archs., Todd & Walker, 324 Stimson Block; T. E. Newlin, County Clk.

SANTA ANA, CAL.—Dennis Farwell, of Los Angeles, have prepared plans for a new county jail. S. Arnor is a member of the committee.

STOCKTON, CAL.—The supervising architect at Washington, D. C., is considering the question of constructing a new U. S. public building in this city.

BRIDGES.

DUNKIRK, N. Y.—Bids are asked until Nov. 5 for constructing a stone arch bridge over Crooked Brook at Fourth St., and for enlarging a stone culvert at Railroad Ave. John F. Maloney, Cy. Clk.

LITTLE FALLS, N. Y.—The board of public works has adopted plans for a bridge over the canal at German St. Div. Engr., Dewitt C. Smith, Albany.

LONG ISLAND CITY, N. Y.—The supervisors of Kings and Queens counties will probably soon make arrangements for the immediate construction of the proposed bridge over Newtown Creek, estimated to cost $250,000. Bids for constructing this bridge were received July 29, and were published, with a description of the proposed structure, in our issue of Aug. 8, but these bids were considered too high. Engr., John J. McLaughlin, Jamaica, N. Y.; Theodore Koehler, Chn. Com.

SYRACUSE, N. Y.—The council has received the following bids for constructing a stone arch bridge over the Harbor Brook at its intersection at Park Ave.: Martin & Sullivan, cement, $3,985; Thomas Nesdale, stone, $4,392; Wynkoop, Keepers & Thatcher, cement, $5,939; Fred L'Strange, stone, $3,393; B. F. Colvin, stone, $3,882.

JERSEY CITY, N. J.—It is stated that the construction of a viaduct at Church St., estimated to cost about $93,000, and two other viaducts at Bramhall Ave. and 13th St., is being considered.

CARBONDALE, PA.—Walter Frick, Cy Engr., it is reported, has prepared plans for four girder bridges estimated to cost about $24,000, bids for which will probably not be asked before spring.

WILLIAMSPORT, PA.—The county commissioners have rejected the bids for constructing a new iron bridge over Muncy Creek at Picture Rocks, estimated to cost about $4,500. Engr., Geo. H. Webb.

WASHINGTON, D. C.—The Washington Market Co. has petitioned the district commissioners for permission to construct a bridge at Ninth St.

BENWOOD, W. VA.—The Bellaire & Benwood Bridge Co. has been organized to build a highway bridge over the Ohio River between Bellaire, O., and Benwood; incorporators, J. H. Reed, J. H. McCrady and George H. Brown, of Pittsburg, Pa.; Charles Rosser, R. M. Gilleland and George W. Yost, of Bellaire, O. The surveys have been completed, and the plans have been filed with the government officials. The structure is to have four river spans, with the channel span 550 ft., and the others about 200 ft. each.

NEW MARTINSVILLE, W. VA.—It is reported that the court of Wetzel county has asked for bids for an iron or steel highway bridge 175 ft. long, to be placed over Big Fishing Creek, at the mouth of Bush Run.

NEW ORLEANS, LA.—Bids are asked by D. A. Rose until Nov. 14 for constructing an iron bridge over the New Orleans Navigation Canal.

AKRON, O.—The matter of building a viaduct over the Cuyahoga Valley is being considered by the citizens, and also by the Akron, Bedford & Cleveland R. R. Co. A movement is now on foot to organize a company in this city to erect the structure. The A., B. & C. R. R. Co. will build the bridge if the other company does not co-operate with it. It will cost $300,000, and be of steel, and about ½ mile long.

DAYTON, O.—The council has voted to prepare plans for a new bridge over the river at Main St., according to reports.

OTSEGO, O.—The state board of public works has approved the plans of the county commissioners for a single span bridge over the canal in this place. Joseph Hofman, County Surv., Toledo.

TOLEDO, O.—The committee has received the following bids for constructing a retaining wall for the Perry St. bridge: M. R. Hannin, $2,766 (awarded contract at $2,650); M. Henahan, $2,942; Toledo Bridge Co., Toledo, $2,939.

YOUNGSTOWN, O.—It is reported that the county commissioners, who control the bridges in this city, have decided to erect a $50,000 bridge over the river, connecting the Fourth and Fifth wards, provided with double track for a street railway, which will give a direct line to Mill Creek Park, on which the city is spending a half million dollars in improvements. The street railway company will contribute largely towards the bridge.——The city commissioners are considering the question of constructing a viaduct, to cost $150,000 to $200,000.

BAY CITY, MICH.—The Inter-Urban St. Ry. Co. has been granted permission by the supervisors to construct a bridge over the Saginaw River. John M. Nicol and Frank E. Snow, of Detroit, and Wm. J. Hart and L. T. Durrand, of Saginaw, are interested.

ECORSE, MICH.—It is stated that the Wyandotte & Detroit River Ry. Co. is considering the question of building a bridge over the River Rouge. Gen. Man., S. Hendrie, Detroit.

CHAPIN, ILL.—Bids are asked until Nov. 7 for build-

ing a wooden bridge 105 ft. long near this place. Frank J. Heine, County Clk., Jacksonville.

CHICAGO, ILL.—J. L. Silsbee, of Chicago, has prepared plans for a bridge to cost about $30,000 over the race-track in Garfield Park proposed by the west side park commissioners.

JACKSONVILLE, ILL.—Bids are asked until Nov. 9 for building a pile bridge 60 ft. long about two miles from Markham. Frank J. Heine, County Clk., Jacksonville.

ASHLAND, WIS.—The Wisconsin Central Ry. Co. has decided to remove its present wooden bridges on Vaughn Ave., and build one steel structure.

DAVENPORT, IA.—It is reported that subscriptions are being secured for a new bridge in this city, to cost $50,000.

SIOUX CITY, IA.—Plans have about been completed for the approach to the Iowa side of the Pacific Shore Line bridge, contracts for which will probably soon be awarded.

ST. PAUL, MINN.—The aldermen are again considering the question of constructing an iron bridge, 400 ft. long and 30 ft. wide, at St. Anthony Park, at an estimated cost of about $30,000. L. W. Rundlett, Cy. Engr.

KANSAS CITY, MO.—H. H. Filley, Cy. Engr., writes us as follows concerning the proposed Allen Ave. viaduct, which is intended to carry the street traffic over several railway tracks, in order to abolish the present grade crossing: It comprises two spans, of 100 ft. each about 530 lin. ft. of metallic trestle, with earth-embankment approaches, double plank floor on timber joists, clear roadway of 24 to 26 ft., one sidewalk, 6 to 7 ft. in width; total estimate of steel and iron work, about 335,000 lbs. The right of way has not all been acquired, therefore work may not be done until next season. Complete specifications have not yet been drawn. The cost of the structure is to be divided between the city, three railway companies, and one other corporation.

TOPEKA, KAN.—The commissioners of Shawnee county have decided to build a bridge across the Kaw River into Topeka. It is to be built on Kansas Ave. and is to be a concrete, steel-arch bridge, and is estimated to cost $150,000.

LINCOLN, NEB.—The council has passed an ordinance for issuing $200,000 in bonds for constructing the north side viaduct. Adna Dobson, Cy. Engr.

LITTLE ROCK, ARK.—The commissioners have decided to construct the proposed bridge over the Arkansas River at Main St., estimated to cost $300,000. Consult. Engr., James A. Martin; Theo. Hartman, Cy. Engr. J. A. Woodson, Mayor, and W. W. Dickinson are interested.

LOS ANGELES, CAL.—The city engineer has received plans for a bridge over the Los Angeles River, bids for which will probably soon be asked.

SACRAMENTO, CAL.—The Southern Pacific Ry. Co. is negotiating with the city trustees in regard to building a bridge over the Sacramento River.

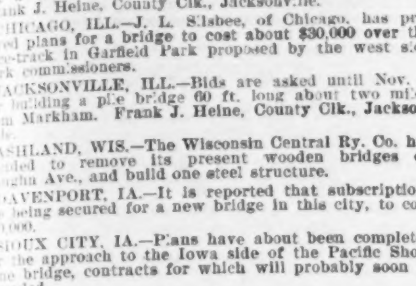
BOISE CITY, IDAHO.—Bids are asked until Nov. 16 for rebuilding the bridge over the Boise River, according to reports. Chas. S. Kingsley, Clk. Bd. County Comrs., Boise City.

BATH, N. B.—It is reported that bids are being received by the supervisors for building a bridge over the Gisignit River, in Wicklow Parish.

ST. THOMAS, ONT.—James A. Bell, Cy. Engr., is reported as preparing plans for a 60-ft. steel bridge, to replace the present structure at Glencolin.

TORONTO, ONT.—The Canadian Pacific Ry. Co. has prepared plans for a bridge at York St., which have been approved by the city engineer. Work will be begun at once.

WATER-WORKS.



BAR HARBOR, ME.—The Bar Harbor Water Co. is reported as receiving bids for the construction of a new dam, 400 ft. in length. Engr., Freeman C. Coffin, of Boston.

LAMOINE, ME.—The Lamoine Water Co. is constructing works, which will be extended next year.

NEWPORT, ME.—Learned & Brown, of Waterville, have been awarded the contract for extending the mains of the Newport Water Co. The work will cost about $10,000.

WALDOBORO, ME.—It is reported that this place is agitating the question of water-works.

ISLAND POND, VT.—A petition has been presented to the selectmen asking that a town meeting be called to vote on the question of purchasing the works of the Island Pond Aqueduct Co., and the construction of a new main for fire protection.

CONCORD, N. H.—The commissioners have contracted with the Boscawen Water-Works Co. for an additional supply from Walker Pond, in Webster. About 1,200 ft. of additional main will be required.

PETERBORO, N. H.—Frank L. Fuller, of Boston, is preparing plans for works at this place.

ACTON, MASS.—Press reports state that Frank L. Fuller, of Boston, has made surveys, and will soon submit a report in regard to a stand-pipe and complete system of water-works.

BROOKLINE, MASS.—The water board has been authorized to purchase pipe for the season of 1896.

HATFIELD, MASS.—J. B. Lowell, E. B. Dickinson and D. W. Wells have been appointed water commissioners, and will have charge of the construction of the new works, for which $30,000 in bonds have been voted.

LEOMINSTER, MASS.—The water commissioners awarded the contract Oct. 28 to Michael Little, of East Boston, for the construction of the Fall Brook reservoir, for which $125,000 has been appropriated. The contract price is said to be about $70,000, the reservoir to be completed Dec. 15, 1896.

LEXINGTON, MASS.—At a town meeting, Oct. 28, it was voted to appropriate $200,000 to purchase the plant of the Lexington Water Co.

LOWELL, MASS.—A special committee of the city council is reported to have recommended a loan of $40,000 for the purchase of water meters.

PITTSFIELD, MASS.—The council has appropriated $1,200 for a new boiler at the Sackett Brook station, and $2,000 for an extension of the mains.

WINCHENDON, MASS.—F. L. Fuller, 12 Pearl St., Boston, has been engaged to prepare plans and specifications for the proposed works, noted Oct. 10 and 17. The commissioners are J. H. Fairbanks, C. A. Smith and W. C. Corey.

DANBURY, CONN.—Plans for securing a water supply from Boggs Pond are reported to have been completed by Chas. O. Brown, Cy. Engr., and the council is said to be taking steps to issue the $150,000 in bonds recently authorized for this work.

LAKEVILLE, CONN.—The Lakeville Water Co. is reported about to construct a new reservoir above the present one, and to make certain extensions.

MERIDEN, CONN.—E. B. Moss, Cy. Engr., writes us that preliminary surveys have been completed for a 42,000,000-gallon reservoir, to be located on the West Mountain; height of proposed dam, 47 ft.; length, 500 ft.; estimated cost, $36,000. The plans will be considered by the council at the November meeting.

SOUTH NORWALK, CONN.—W. B. Rider has presented plans for a gravity filter plant, to cost $14,228.

SUFFIELD, CONN.—The Suffield Water Co. has disposed of $6,000 of its stock, and it is expected that mains will be laid in the spring.

AKRON, N. Y.—James D. Childs, Village Clk., writes us that no engineer has yet been engaged to prepare plans for the proposed works, for which $30,000 in bonds have been voted, as noted last week.

ALBANY, N. Y.—Bids are asked by the water board until Nov. 4 for the construction of 350 ft. of 5-ft. intake pipe, estimated to cost $10,800.

CENTRAL VALLEY, N. Y.—A press report states that the contractor for the new works will not be permitted to use Cromwell Lake as a water supply, and that if this is not done an additional expense of about $10,000 will be incurred in the construction of the plant.

CLYDE, N. Y.—W. F. Ross, of Rochester, Man. Clyde Water Supply Co., is reported as arranging for a new location for a filter.

FORT ANN, N. Y.—It is reported that this place is considering bids for the construction of works.

GOSHEN, N. Y.—The water commissioners have appropriated $2,000 to increase the storage capacity of the reservoir. Fred Knight, of Monroe, N. Y., is making surveys to determine the advisability of raising the dam as well as investigating other methods for securing an increased supply.

NORTH JAVA, N. Y.—The residents of this place are considering plans for a gravity supply. The town is at present without fire protection, according to reports.

SOUTH GLENS FALLS, N. Y.—The village board has not yet decided whether to secure a water supply from the river or not. A board of water commissioners was to have been organized last week, and it is expected that the plans for a system will be decided upon at an early date.

SCHENECTADY, N. Y.—The water commissioners have voted to ask the council to issue $30,000 in bonds for improvements. It is stated that the present cement pipes will be replaced with iron pipes and all dead ends abolished.

SYRACUSE, N. Y.—Bids are asked by the water board until Nov. 9 for 50,000 lbs. of ½-in. A. A. A. lead pipe. W. R. Hill, Ch. Engr.

THERESA, N. Y.—The awarding of a contract for the construction of works was noted last week. The contract for furnishing power for pumping water has been awarded to Snell & Makepeace at $500 a year for 15 years, according to reports.

ATLANTIC CITY, N. J.—The water commissioners have petitioned the council to issue $225,000 in bonds for proposed improvements. The council has voted to appropriate $175,000 for this purpose.

BORDENTOWN, N. J.—C. T. Leland, Arch., of Philadelphia, is said to be preparing plans and specifications for a pumping station at this place for the H. M. Scipie Co.

FRANKLIN, N. J.—The township committee has voted to issue $47,000 of water bonds.

MARLTON, N. J.—A committee is reported to have been appointed to agitate the question of works. It is proposed to organize a company that will erect a pumping station and lay about five miles of mains.

PLAINFIELD, N. J.—The Plainfield Water Co. has purchased the South Plainfield Pond as a water supply, which, it is stated, will eventually take the place of the Elizabeth River water.

SEA ISLE CITY, N. J.—It is reported that this place will soon have water-works and sewers, at a cost of $150,000.

ALLEGHENY, PA.—At a meeting of the select council Oct. 23 the contract for the boilers for the new water-works was awarded to the Edge Moor Iron Co., of Wilmington, Del., at $46,700.

EAGLESMERE, PA.—The Eaglesmere Land Co. will probably construct works next year.

GREENSBURG, PA.—Murray Forbes, Man. Westmoreland Water Co., writes us that only preliminary plans and arrangements have yet been made for the proposed storage reservoir, noted last week as estimated to cost $150,000 to $200,000.

HANOVER, PA.—H. E. Young, Treas. Consumers' Water Co., writes us that E. M. Kenley, of Baltimore, has been engaged to prepare plans for the proposed works. A franchise has just been granted the company, the incorporation of which was noted last week.

MALVERN, PA.—It is reported that an election will soon be held to vote on the question of constructing municipal works.

NAOMI PINES, PA.—F. C. Miller, of Easton, Pa., Treas. Pocono Spring Water Ice Co., noted Oct. 17 as incorporated, writes us that the company is doing its own work, and will not award any contracts. Engr., J. M. Young, of Easton, Pa.

READING, PA.—A press report states that Springmont, a new suburb of this city, is to be supplied with water from the Sinking Spring Co.'s reservoir.

SCRANTON, PA.—The Scranton Gas & Water Co. has contracted with Burke Bros. for the construction of a new dam at Burnt Bridge. It is stated that the dam will be 540 ft. in length, 7 ft. high and will be completed Nov. 1, 1896; the reservoir will cover 185 acres.

WILKES BARRE, PA.—The state board of health has directed the Crystal Spring Water Co. to discontinue using Crystal Lake as a water supply.

BALTIMORE, MD.—Local papers state that the engineers of the water department are preparing plans for work which will involve an expenditure of $2,000,000. The work was authorized by the last legislature and will include extensions of the mains and the construction of one or more reservoirs.

HYATTSVILLE, MD.—The citizens are reported to have adopted the plans recently prepared by Mr. Adelsburg, of Baltimore, and to have voted to petition the next legislature for authority to issue bonds for the construction of the plant.

PRINCESS ANNE, MD.—Chas. S. York, of Chestertown, who was recently awarded the contract for constructing works at this place, is said to be about to commence the construction of the plant.

ATLANTA, GA.—The council has authorized the water board to purchase pipe and lay an additional main from pumping station No. 2 to the city, as recommended in the mayor's message of Oct. 21. The work will probably cost about $50,000.

MARIETTA, GA.—The city clerk writes us that the council has granted a franchise to the Marietta Paper Mfg. Co. to put in water-works.

ROME, GA.—E. L. Bosworth, J. T. Warlick and W. W. Vandiver have been appointed water commissioners, and it is stated that bonds will at once be issued to pay off the floating indebtedness and for the construction of a filter plant.

ANNISTON, ALA.—Local papers state that the Bessemer Water Co. is contemplating the extension of a water main to Glens Springs, and another across Valley Creek to a large spring near the old Spencer place.

UNION SPRINGS, ALA.—A press report states that this place will probably have water-works and electric lights at an early date.

GREENVILLE, MISS.—It is reported that plans and specifications are being prepared by Captain Hider, and that bids for constructing the plant will be received as soon as the specifications are completed.

MORRISTOWN, TENN.—The board of aldermen has declared forfeited the contract made with Hazleworth & Co., of Atlanta, for the construction of works.

FALMOUTH, KY.—P. H. Porter & Co., of Louisville, Ky., have been engaged to make surveys, plans and specifications for work at this place, for which it is reported that $15,000 in bonds have been voted.

HUNTSVILLE, KY.—A press report states that the residents of this place want water-works.

LOUISVILLE, KY.—The board of public works is reported, in local papers, as to purchase about 2,000 new fire plugs during the ensuing year.

ELYRIA, O.—W. H. Park, Cy. Clk., writes us that the vote on purchasing the present system will be held Nov. 5. The vote on a new supply will be held later. It is stated that the water company offered to sell its plant for $100,000, but that this offer has been withdrawn, and that public sentiment seems in favor of a new contract with the water company.

GIBSONBURG, O.—It is stated that the question of works will be voted upon at the election next month.

GLENVILLE, O.—The council is considering a resolution providing for an election to vote on an issue of $100,000 in bonds for water-works and sewers.

HOMEWORTH, O.—P. W. Taylor writes us that this village is not incorporated and is not expecting to construct water-works for several years.

PAINESVILLE, O.—W. G. Hawkins, Clk., writes us that this city has voted to issue bonds to construct municipal works, but that the construction cannot be commenced until after the meeting of the legislature, about Jan. 1, 1896.

ST. MARY'S, O.—Bids are asked until Nov. 14 for constructing works, as described in our advertising columns. John W. Hill, Engr., Glenn Bldg., Cincinnati; O. E. Dunan, Chn. Trustees.

UNIONVILLE, O.—It is reported that this place will soon vote on the question of issuing bonds for water-works and electric lights.

WINTON PLACE, O.—Bids are asked until Nov. 18 for the purchase of $25,000 in water bonds. Address R. B. Poage, Clk., care of Chas. A. Ewing, Engr., Carlisle Bldg., Cincinnati.

HUNTINGTON, IND.—A resolution has been offered in the council urging the necessity of a better water supply, and recommending the sinking of 12 additional wells and the construction of additional mains.

SHELBYVILLE, IND.—The water and electric light plant was purchased at auction, Oct. 21, by Judge Geo. H. Holt, of New York.

SULLIVAN, IND.—A press report states that the town board is considering the question of water-works, and has directed the clerk to correspond with companies in regard to constructing works.

WALKERTON, IND.—William Clem, Secy. Walkerton Water-Works Co., writes us that the company has just been organized and has not yet decided what kind of a system will be constructed, but that the question will soon be decided.

WARSAW, IND.—Geo. H. Holt, of New York, is reported to have purchased the works at master's sale, Oct. 21, for $75,000.

CORUNNA, MICH.—At a special election Oct. 24, the citizens voted to issue $30,000 in bonds for water-works and an electric light plant.

HIGHLAND PARK, MICH.—E. Ketcham, Village Clk., writes us that nothing definite has yet been done in regard to the construction of water-works or sewers in this village.

LUDINGTON, MICH.—There is talk of issuing $130,000 in bonds for the purchase of the water-works and the electric light plant. The board of trade is interested.

MOUNT CLEMENS, MICH.—The water board is reported to have decided to petition the council for an appropriation of $100,000 for a water supply from Lake St. Clair. Consult. Engr., W. S. Parker, Pontiac, Mich.; S. J. Daiby, Clk. Comrs.

NEGAUNEE, MICH.—The council has voted to extend the mains in several streets.

SCHOOLCRAFT, MICH.—The local paper is urging the citizens to secure water-works, electric lights and other improvements.

ASSUMPTION, ILL.—The contract for sinking the well for the new works has been awarded to Mr. Watts, of Pana, Ill., at $975. It is reported that a daily supply of 250,000 gallons is guaranteed.

CANTON, ILL.—The P. & O. Co. is reported as constructing private works at this place, at a cost of $10,000.

CABERY, ILL.—There is talk of constructing works at this place, and it is probable that a water company will soon be organized. Geo. Garnon, Village Clk.

CHICAGO, ILL.—Residents of Lake View recently met at the Sherman House and appointed a committee to secure a better water supply for that place. Bernard J. Mahony, Chn. Com.

GALESBURG, ILL.—The city engineer is investigating the question of a water supply from artesian wells, and it is reported probable that a well will soon be sunk in this city.

GENEVA, ILL.—D. M. Flynn, Cy. Clk., writes us that it is likely that nothing will be done in the matter of water-works until next year at least.

GILMAN, ILL.—John Laughlin, of Streator, has submitted plans and specifications for works, and a committee has been apointed to sink a test well for a water supply. It is probable that bids will soon be asked for constructing the plant.

JOLIET, ILL.—The council is considering methods for increasing the water supply. The city attorney reports that only $5,000 in bonds can be issued on account of the present indebtedness. There is talk of a partial adoption of the meter system.

NUNDA, ILL.—A franchise has just been granted for an electric plant, and it is stated that water-works is the next improvement contemplated.

ODELL, ILL.—J. H. Cosgrove, Village Clk., writes us that the village is prospecting for water, but that the question of works will not be decided until a water supply has been secured. Population, 1,000.

BERLIN, WIS.—Bids are asked until Nov. 6 for the construction of works on a franchise basis, according to plans prepared by D. P. Blackstone, Engr. Henry Morman, Cy. Clk.

LANCASTER, WIS.—A press report states that the city has sold the $24,000 of water-work bonds recently voted, to Farson, Leach & Co., of Chicago, for $24,619.

MAUSTON, WIS.—The city has sold $10,000 of water bonds for $10,150, and the contract for constructing works has been awarded to Fairbanks, Morse & Co., of Chicago.

PLATTEVILLE, WIS.—F. M. Gray, of Milwaukee, has been awarded the contract for the artesian well for the new works. Bids for the construction of the works were received Oct. 20, as advertised in Engineering News. Chester B. Davis, Chicago, Consult. Engr.

REEDSBURG, WIS.—This city voted a year ago to issue $30,000 in bonds for water-works and electric lights, but was prevented from constructing the plant by an injunction suit, which has just been decided in favor of the city. It is probable that the improvements will now be made. C. C. Stevens was city clerk last year.

WAUWATOSA, WIS.—Myron Gilbert, Village Clk., writes us that the election Oct. 15 resulted by a vote of more than two to one in favor of issuing $40,000 in bonds for works, for which W. H. Wheeler & Co., of Beloit, Wis., have repared plans.

AMES, IA.—Bids are asked until Nov. 10 for constructing a deep well for the Iowa Agricultural College, as stated in our advertising columns. Address Prof. G. W. Bissell.

CENTERVILLE, IA.—J. P. Gribben, Cy. Clk., writes us that all contracts for works have been awarded, and the construction will be pushed as rapidly as possible.

COLUMBUS JUNCTION, IA.—C. M. Fulton, Mayor, writes us that the following bids were received for constructing works, as advertised in Engineering News:

The Smedley Mfg. Co., Dubuque, Ill.	$10,392
Jackson & Moss, Des Moines	10,608
B. Schreiner & Co., Des Moines	11,117
U. S. Wind Engine & Pump Co., Batavia, Ill.	11,240
Geo. C. Morgan, Chicago	14,950

The Laidlaw-Dunn-Gordon Co., of Cincinnati, O., bid $1,107 for a pump, and $1,015 for boilers, heaters, etc.; the Gardner Governor Co., Quincy, Ill., $800 for a pump; W. F. Clements, Agency, Ia., $974 for pump and $2,293 for machinery, etc.; Morgan & Kincade, Muscatine, Ia., $10,050 for pump station, and $3,771 for brick tower; Corey Co., of St. Louis, $22.75 each for Corey hydrants.

HEDRICK, IA.—A committee has been appointed to investigate the question of water-works and report at the next meeting of the city council.

LE MARS, IA.—A petition has been presented asking that a receiver be appointed for the water-works and electric light plant.

MOUNT VERNON, IA.—C. S. Curley, Recdr., writes us that the city is discussing the question of water-works, but that no election has yet been called to vote on the question.

STORY CITY, IA.—The "Herald" of this city thinks that works can be constructed for $5,000 or $6,000, and urges that immediate steps be taken to secure a plant.

NEW PAYNESVILLE, MINN.—The city is reported to have sold $5,000 of water bonds for $5,188. Bids were opened Oct. 21 for constructing the works. Alfred Watson, Recdr.

DULUTH, MINN.—Bids are asked until Nov. 11 for the purchase of $1,000,000 of water and light bonds. C. E. Richardson, Cy. Clk.

PRESTON, MINN.—At an election Oct. 23 the citizens voted, 151 to 58, in favor of water-works and an electric light plant.

PROCTOR KNOTT, MINN.—The Duluth "Herald" states that efforts are being made to construct water-works for this village. H. R. Patterson, J. L. Gallagher and A. L. Brainard are members of the committee appointed to investigate the question.

VERNDALE, MINN.—This town is reported as agitating the question of an artesian well.

GREAT FALLS, MONT.—M. S. Parker, Consult. Engr., writes us that the plans and estimates for new works in this city are simply for comparison with present system as to cost. The water company has offered to sell its plant to the city, and the city is having new plans prepared to ascertain what the plant can be duplicated for, the construction of new works or the purchase of the present plant depending upon the price asked by the water company.

EVEREST, KAN.—A press report states that $600 has been raised for the construction of works.

OMAHA, NEB.—The park commissioners have contracted with Morris Morrison for the sinking of an artesian well in Elmwood Park. The well will be 6 ins. in diameter and probably 500 ft. deep, and it is proposed to supply a lake of about 15 acres.

FORMAN, N. DAK.—It is reported that a special election was held Oct. 24 to vote on an issue of $5,500 in bonds for sinking three artesian wells in this township, and that elections for the same purpose were also held in the townships of Bowen, Rutland and Dunbar.

EDGERTON, MO.—Geo. Sturgiss, Clk., writes us that this city will not construct water-works at present.

UNIONVILLE, MO.—It is reported that the citizens will soon vote on the question of water-works and electric lights.

PINE BLUFF, ARK.—Chas. Nell is a member of a committee appointed to correspond with parties in regard to constructing works in this city. J. B. White, Cy. Engr.

CORSICANA, TEX.—Hiram Phillips, of St. Louis, has been engaged to prepare plans for the Corsicana Water Development Co.'s plant. The water supply will be from artesian wells.

TEXAS CITY, TEX.—It is reported that works will be constructed by J. R. Truesdale, 208 Temple Bldg., St. Louis.

PORT TOWNSEND, WASH.—The following bids were received by the supervising architect at Washington Oct. 22, according to reports, for the construction of a water station near this place, 1 being the bid for reservoir A; 2, addition for reservoir B; 3, addition for reservoir C; 4, addition for reservoir D:

	1.	2.	3.	4.	Time, days.
Nichols & Crothers*	$5,880	$122.00	$282.00	$1,422	90
C. P. Wakeman	5,916	236.83	63.00	1,955	150
Otto A. Schanz	5,996	260.00	96.00	1,200	90
Pardee & Shehan	6,336	88.00	152.00	1,788	120
A. S. Whiteway	6,220	325.00	207.00	2,076	120

* Tacoma, Wash.; all others, Port Townsend.

MONMOUTH, ORE.—It is reported that negotiations are being made with capitalists with a view to the construction of a water-works and electric light plant in this city.

LOS GATOS, CAL.—G. H. Butler, Town Clk., writes us that nothing has yet been done in regard to the proposed water-works.

SAN DIEGO, CAL.—A press report states that the city council has offered the San Diego Water Co. $500,000 for a distributing system, and the Southern California Mountain Water Co. $1,075,000 for the Upper Otay dam and connections, and that the latter offer has been already accepted. It is stated that should the city vote the bonds necessary to carry out these propositions the entire Mount Tecarte system will be completed at a cost of $3,000,000.

SANTA CRUZ, CAL.—At a meeting of the board of supervisors Oct. 14 a franchise was granted the H. Cowell Co. for a water system in East Santa Cruz. The supply will be taken from Eagle Creek. The company also has the privilege of building reservoirs and laying pipes in Branciforte or East Santa Cruz.

VERNON, B. C.—R. J. Davies, Cy. Clk., writes us that plans for works were prepared last year, but that nothing definite has yet been decided upon in regard to the construction.

TORONTO, ONT.—E. R. C. Clarkson is endeavoring to obtain the necessary signatures for the construction of the Island water-works, estimated to cost $15,000.

THOROLD, ONT.—It is reported that the citizens are discussing the construction of works estimated to cost $40,000.

SUMMERSIDE, P. E. I.—The Summerside "Journal" is agitating the necessity of water-works for this city.

NORTH SYDNEY, N. S.—At a recent meeting of the taxpayers of this town the council was directed to engage an engineer to report on plans and estimates for proposed works. A preliminary report was presented by C. M. Odell, Engr. J. N. Armstrong, Town Clk.

IRRIGATION.

GOTHENBURG, NEB.—We are informed that a proposition submitted to the voters of the Lincoln and Dawson county irrigation district, comprising 40,000 acres of land lying on the north side of the Platte River in Lincoln and Dawson counties, to vote 6% bonds to the amount of $275,000, has been carried by a majority of 84 to 18. The canal will be 62 miles long, with 115 miles of laterals, and will be 100 ft. wide at its head. The earthwork is estimated at 2,213,550 cu. yds. Contracts will be let in about two weeks. Ch. Engr., Rudolph Sturnegk; Asst. Engr., C. B. Channel, Cy. Engr., of Gothenburg.

CANYON CITY, COLO.—Press reports state as follows: Contracts have been let by the Fruitland Water Co. for the remainder of its ditch and reservoir, and work is progressing rapidly. At the present rate of progress water will be running through the ditch by March 1. The ditch will be 4½ miles long, with a pipe line through the city of 1,450 ft., and will add to Canyon City more than 1,200 acres of land, all within one mile of the city limits. To furnish the water a pumping plant will be put in near the Canyon City flour mills. F. A. Raynolds, of the Fremont County Bank, and Henry Earle, of the Canyon City mills, are interested.

SEWERAGE.

ELLSWORTH, ME.—F. W. Rollins writes us that surveys have been made and plans are being prepared for a system.

FARMINGTON, ME.—Geo. H. Titcomb, Cy. Clk., writes us that an appropriation was made for surveys for a system, and that the surveys have been completed.

HARDWICK, VT.—Plans are being considered for extending the outlet sewers into the river, work on which will probably be begun in the spring.

WALTHAM, MASS.—The construction of a sewer to cost about $35,000 for Norumbega Terrace and Prospect Park is being considered.

BINGHAMTON, N. Y.—Bids are asked until Nov. 4 for constructing a sewer in Mitchell Ave. H. C. Comsted, Acting Cy. Clk.

BUFFALO, N. Y.—Bids are asked until Nov. 12 for constructing 15 to 10-in. pipe sewers in three streets. R. G. Parsons, Secy. Pub. Wks.

BUFFALO, N. Y.—Bids are asked until Nov. 14 for constructing a 36 to 30-in. brick sewer in Jefferson St. and a 15 and 12-in. pipe sewer in Weiss St. R. G. Parsons, Secy. Bd. Pub. Wks.

FAR ROCKAWAY, N. Y.—We are informed that an error in the hours during which the polls were open for the sewerage election in this city compels a resubmission of the question to the people. This election will take place Nov. 9. Engr., Alexander Potter, 137 Broadway, New York.

GENEVA, N. Y.—The secretary of the state board of health has recommended the construction of sewage disposal works or an extension of the system to the Seneca River.

NEW YORK, N. Y.—Bids are asked by the commissioner of street improvements, 2622 Third Ave., until Nov. 4 for constructing sewers in five streets.

NEW YORK, N. Y.—Bids are asked until Nov. 12 for building sewers in three streets. Wm. Brookfield, Comr. Pub. Wks.

NIAGARA FALLS, N. Y.—Bids are asked by the board of public works until Nov. 1 for lowering the sewer in Main St.——The following bids have been received for extending the 60-in. 22d St. trunk sewer 1,867 ft. to Buffalo Ave.: Banks & Ingles, $17,162; R. D. Young, $15,852; A. C. Douglass, $14,667; Clements & Co., awarded contract, $13,986.

PELHAM MANOR, N. Y.—The sewer commissioners are considering plans for a system according to reports.

SYRACUSE, N. Y.—The council has received the following bids for constructing a 44 to 30-in. brick sewer in three streets: P. H. Harrison & Sons, $18,473; Thomas Marnell, $21,508; John W. Bustin, $17,124. Cy. Engr., Henry C. Allen.

TARRYTOWN, N. Y.—It is stated that the question of constructing a system will probably soon be submitted to the voters.

BLOOMFIELD, N. J. Bids are asked until Nov. 11 for constructing a 10 to 8-in. pipe sewer in Belleview Ave., as described in our advertising columns. A. H. Olmsted, Engr.; Wm. L. Johnson, Clk.

BORDENTOWN, N. J.—The council has engaged an engineer to prepare plans for a system for about 11 miles of streets, estimated to cost $33,000.

CAPE MAY, N. J.—The council is considering the question of improving the system.

SEA ISLE CITY, N. J.—It is reported that a sewer system and water-works are to be constructed at a cost of $150,000.

ELIZABETH, PA.—This place has sold $9,000 in bonds for a sewer system, plans for which have been prepared.

WASHINGTON, D. C.—The district commissioners will petition congress for an appropriation for a sewer in Brightwood. Claude F. King, of the Brightwood Citizens' Association, is interested.

WILSON, N. C.—It is reported that an election is to be held Nov. 25 to vote on the question of issuing $17,000 in bonds for a system.

COLUMBIA, S. C.—It is stated that the aldermen are considering the question of constructing a system.

PADUCAH, KY.—Chas. Reed, Chn. Com., writes us that the city will take no action on proposed system until after Nov. 5, when a new council will be elected.

BUCYRUS, O.—E. B. Shifley, Cy. Engr., writes us that it is probable that the council will soon order plans and estimates prepared for the proposed intercepting sewer.

CLEVELAND, O.—An ordinance has been prepared authorizing the construction of the Walworth Run sewer, estimated to cost about $500,000.

GLENVILLE, O.—C. A. Livingston, of Glenville, has introduced a resolution in the council authorizing the mayor to issue a call for a special election to vote on the question of issuing $100,000 in bonds for the construction of sewers and water-works.

GREENVILLE, O.—John P. Force, Consult. Engr., Fostoria, O., writes us that the council has approved plans prepared by him for a system comprising 15½ miles of sewers and the sedimentation and intermittent filtration system of sewage disposal, the total estimated cost of which is $85,000. The question of building the system will be voted on Nov. 5.

MANSFIELD, O.—The question of issuing $40,000 in bonds for sewage disposal works will be voted upon at the election Nov. 5. T. R. Robinson, City Solicitor; F. M. Remy, Cy. Clk.

CINCINNATI, O.—Bids are asked until Nov. 26 for constructing sewers in three streets. A. P. Butterfield, Clk. Bd. Administration.

TOLEDO, O.—Bids are asked until Nov. 11 for constructing 24-in. brick to 15-in. pipe sewers in four streets. L. P. Harris, Cy. Clk.

EVANSVILLE, IND.—The board of public works has rejected the following bids for constructing sewers, and have decided to readvertise: Kessler & Carter, main sewer, per ft., $3; inlets, $50; manholes, $35; Y's, $3. Michael Weber, $2.95, $45, $35, $2.25. James B. McGuire, $1.85, $30, $30, $2.

INDIANAPOLIS, IND.—The board of public works has voted to construct an intercepting sewer, 54 to 30 ins. in diameter, and 4,000 ft. long, bids for which will

be received about Nov. 10.——M. G. Honaday, Ch. Clk., Engr. Dept., informs us that the following bids were received Oct. 24 for constructing a brick sewer, all the bidders being residents of Indianapolis: Browder & Shover, $4.45 per ft.; W. R. Mercer, $4.47; Capitol Paving & Constructing Co., $4.64; Ganesberg & Roney, $4.78; Sheehan Bros., $4.83; M. M. Defrees, $4.97; Wm. Bossert, $5.27; Hege & Sebern, $5.36. The city engineer has been instructed by the board of public works to prepare new plans and specifications for this sewer, and the work will be readvertised for upon a different basis of assessment than that formerly contemplated.

TERRE HAUTE, IND.—John A. Cole, 1585 Old Colony Bldg., Chicago, Ill., has been engaged by the committee to prepare plans for a belt sewer system. John Lewis, Chn. Com.

BELVIDERE, ILL.—A. E. Jenner, Cy. Clk., writes us that plans have been approved and an ordinance passed for five miles of 14 to 4-in. pipe sewers, average cut 12 to 10 ft. Probably no work will be done this fall. Engr., John W. Alvord, 1140 The Rookery, Chicago.

CHICAGO, ILL.—M. Van Allen, McCormick Block; J. L. Cochran, Geo. M. Boyd and A. H. Hill have been appointed a committee by the residents of Lake View to consider plans for improving the sewer system of that section of the city. Bernard J. Mahoney, Chn. Com.; B. M. Wiedinger, 884 Lincoln Ave., and P. A. Passow are interested.

LINCOLN, ILL.—Bids are asked until Nov. 4 for constructing a sewer in Chicago St. Frank Rollin, Cy. Clk.

MORGAN PARK, ILL.—Bids are asked until Nov. 5 for constructing a 54-in. brick sewer in Ashland Ave. Engr., P. R. Fletcher, 298 Western Ave., Blue Island, Ill.; Edgar Ayres, Village Clk.

QUINCY, ILL.—We are informed that Hiram Phillips, 810 Olive St., St. Louis, Mo., is engaged in preparing plans and specifications for a sewer system in that portion of the city now without sewers. No contracts will be awarded until spring.

FULTON, MO.—It is stated that the construction of sewers is being considered.

KANSAS CITY, MO.—The council has voted to extend a sewer, at an estimated cost of $40,000. H. H. Filley, Cy. Engr.

SPRINGFIELD, MO.—Bids are asked until Nov. 5 for constructing sewers. C. P. Johnson, Cy. Engr.

SAN FRANCISCO, CAL.—The board of supervisors has been petitioned by the residents south of Golden Gate Park for a system. Adolph Sutro, Mayor, is interested.

SANTA MONICA, CAL.—R. R. Tanner, Cy. Atty., writes us that it is proposed to construct a system, at an estimated cost of $40,000. Engr., T. H. James, Santa Monica.

UKIAH, CAL.—It is proposed to construct a system. Engr., R. E. Donahue.

LACHINE, QUE.—We are informed that Dupont, Leduc & Bourque, 35 Rue St. Jacques, Montreal, Que., have been engaged as the engineers for a system for this place, estimated to cost about $200,000.

GARBAGE DISPOSAL.

NEW YORK, N. Y.—Bids are asked until Dec. 10 for collecting and disposing of all ashes, garbage, sweepings, etc. Geo. E. Waring, Comr. of St. Cleaning.

SYRACUSE, N. Y.—The contract for a garbage disposal plant was awarded nearly two years ago to the American Reduction Co. Several sites in the city have been selected for the plant, but each in turn has been rejected. It is now proposed that the city purchase a site outside the city, so that the company can construct its plant at an early date.

CHICAGO, ILL.—The finance committee of the council received seven bids Oct. 25 for a garbage disposal plant, but voted not to open them, but to have plans and specifications prepared, and to advertise for new bids. It is stated that no purchase will be made until after a competitive test of the different systems.——The American Refuse Co. has made an assignment. The liabilities are about $3,500, and the assets about $9,000, including the value of the plant at 43d and Lincoln Sts. This crematory was built some time ago, as noted in these columns, with a view to its sale to the city.

LOS ANGELES, CAL.—This city is having trouble with its present method of garbage collection and disposal. C. A. Luckenbach, Cy. Clk.

STREETS AND ROADS

GLASTONBURY, CONN.—Bids are asked by the selectmen until Nov. 2 for macadamizing a road.

TRUMBULL, CONN.—Bids are asked until Nov. 4 for constructing a macadam road. Chas. B. Nichols, of Nichols, Conn.

ALBANY, N. Y.—Bids are asked until Nov. 4 for paving three streets with brick and granite blocks; six sureties of $5,000 each. Thos J. Lanahan, Clk.

BROOKLYN, N. Y.—Bids are asked until Nov. 7 for repaving West St. from Greenpoint Ave. to Eagle St. with granite blocks; surety, $8,250; and for macadamizing a portion of Eastern Parkway; surety, $5,500. Alfred T. White, Com. Cy. Wks.

NEW YORK, N. Y.—Bids are asked by the commissioner of street improvements, 2622 Third Ave., until Nov. 4 for paving three streets with granite blocks.

NIAGARA FALLS, N. Y.—It is proposed to pave Main St. with asphalt at an estimated cost of $26,000, or with brick at a cost of $21,000, and Ontario Ave. with asphalt at a cost of $30,000, with brick to cost $24,000, or with macadam at a cost of $17,000.

OGDENSBURG, N. Y.—The citizens voted Oct. 23 to issue $8,000 in bonds for paving, according to reports.

JERSEY CITY, N. J.—Bids are asked until Nov. 4 for about 5,000 sq. yds. of Belgian block paving, 3,000 cu. yds. earth and rock excavation, etc. John C. Kaiser, Chn. St. Com.

NEW BRUNSWICK, N. J.—The bids recently received by the board of freeholders for macadamizing a road between Stelton and Dunellen will probably be rejected and the work may be readvertised; estimated cost, $30,000. J. Edgar Powelson, of New Brunswick, is interested.

SYRACUSE, N. Y.—The council has received the following bids for paving Water St.; H. F. Stevens, Cy. Clk.:

	Asphalt.	Brick.	Sandstone.
John Dunfee	$32,672	$34,815	.....
Bermudez Paving Co.	40,369	.....	.....
Trinidad Asphalt Paving Co.	34,462	.....	.....
Warren-Scharf Asp. Paving Co.	42,078	.....	.....
G. D. Grannis	42,278	36,462	$46,192
Fruin-Bambrick Construction Co.	33,201	.....	.....
Syracuse Improvement Co.	43,029	.....	.....
Homer & Co.	.....	32,250	43,554

PALMYRA, N. J.—Bids are asked until Nov. 7 for constructing cement sidewalks. Frank W. Smith, Clk., Palmyra; R. L. Temple, Chn. Com., 548 Bourse Bldg., Philadelphia.

WEST MILFORD, N. J.—Bids are asked until Nov. 11 for constructing a macadam road. Jacob J. Van Noordt, Dir. Freeholders, Passaic county; A. B. Pearce, County Clk.

ALLEGHENY, PA.—At the election Nov. 5, the question of issuing $400,000 in bonds for street improvements will be voted upon. W. M. Kennedy, Mayor.

MEMPHIS, TENN.—J. F. Walker, Cy. Secy., writes us that no definite action has yet been taken in the matter of paving Main St. with brick at an estimated cost of about $80,000.

COLUMBUS, O.—Bids are asked until Nov. 6 for constructing roads and concrete sidewalks at Columbus Barracks, O. Capt. E. S. Dudley, U. S. A.

CLEVELAND, O.—Bids are asked until Nov. 27 for paving Superior St. with Medina stone. D. E. Wright, Dir. Pub. Wks.

MARIETTA, O.—Bids are asked until Nov. 22 for paving Greene Ave. with brick. L. Mueller, Cy. Clk.

NORWALK, O.—Bids are asked until Nov. 6 for 6,000 sq. ft. of sandstone sidewalk. F. W. Christian, Cy. Clk.

BLOOMFIELD, IND.—It is reported that five townships in Greene county have voted for the construction of 52 miles of gravel roads, 11 in number, running from Bloomfield to Switz City, Switz City to Linton, Lyons to Linton road, Linton to Macco, Linton to the Paxton road, Linton to Dugger, Switz City to Newberry, Newberry to Worthington, etc. The estimated cost is $120,000. Address the county commissioners or clerk.

CHICAGO, ILL.—Bids are asked until Nov. 6 for paving in 14 streets. W. D. Kent, Comr. Pub. Wks.——The board of west side park commissioners is considering the question of constructing a cement bicycle track, half a mile long and 25 ft. wide in Garfield Park. It is stated that the cement for this track will cost $15,000.

KENOSHA, WIS.—The city has voted to pave two streets, one of which will be with brick.

MILWAUKEE, WIS.—The committee has recommended the paving of Prospect Ave. with cedar blocks, asphalt or brick. Judge Geo. H. Noyes, Chn. Com.

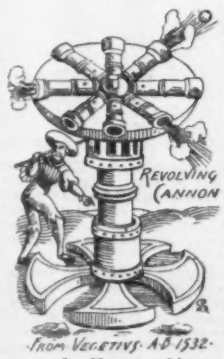
DENVER, COLO.—T. J. Milner, Ch. Engr. Bd. Pub. Wks., writes us that it is proposed to pave 43,000 sq. yds. with asphalt, at an estmated cost of $130,000. This work is subject to petition and remonstrance, and was petitioned for by owners of majority of assessable frontage, and received by board of public works Sept. 4. Time for filing remonstrance expires Nov. 1. The remonstrance must be signed by a majority to prevent work being done. If work is prosecuted, bonds will be issued against the district.

HOUSTON, TEX.—Bids are asked until Nov. 7 for the purchase of $100,000 of 5% paving bonds. John T. Browne, Mayor.

LOS ANGELES, CAL.—It is probable that the council will advertise for new bids for paving Main St., at an estimated cost of $100,000.

SANTA BARBARA, CAL.—An election was held in this city Oct. 28 to vote on the question of issuing $60,000 in bonds for paving, according to reports.

MANUFACTURING PLANTS.



NASHUA, N. H.—The Nashua Mfg. Co. is reported about to build an addition to be used as a bleachery.

MILTON, VT.—It is reported that a company composed of E. W. Richardson, of the New York & Pennsylvania Pulp Co.; Olin Scott, of Bennington; Charles H. Tucker, of Providence, R. I., and others have purchased the water privilege at this place, and will build a large pulp mill.

LEOMINSTER, MASS.—The Richardson Piano Co.'s factory was recently burned; reported loss, $50,000; insurance, $30,000.

BRISTOL, R. I.—Work on the Providence shade roller building has been commenced. New machinery will be put in as soon as the removal of the present machinery can be made.

PROVIDENCE, R. I.—C. R. Makepeace & Co., of this city, are said to be preparing plans for the new $200,000 addition to be built for the Stonewall Cotton Mills at Stonewall Station, Miss.

COLCHESTER, CONN.—The board of trade recently held a meeting and approved a proposition of a New York ribbon company for the location of a factory in this city. P. Buell and E. S. Strong were appointed a committee. The company desires a five-story building 200 × 25 ft.

BRIDGEPORT, CONN.—It is reported that a factory will be erected at the foot of Seaview Ave. and East End, for the manufacture of roofing paper. Frederick Sailer and Gould Bros., of Bridgeport, are interested.

NEW BRITAIN, CONN.—Reports state that the directors of the Stanley Works have decided to make another large addition to the factory.

BROOKLYN, N. Y.—It is reported that W. C. Harvey & Co. will erect a one-story brick iron foundry at the corner of Provost and Eagle Sts., to cost $7,000.

BUFFALO, N. Y.—Reports state that an elevator and mill is soon to be erected at corner of Elk and Prenatt Sts. by E. H. Husted & Co. The building is to be 56 × 105 ft. and 112 ft. high, and will have all modern improvements.

DUNKIRK, N. Y.—The Mulholland Spring & Gear Co.'s factory on Buffalo St. was recently destroyed by fire; reported loss, $35,000; insurance, $25,000.

HORNELLSVILLE, N. Y.—It is reported that Schwarzenbach Bros., of Germania, Pa., have purchased of W. G. Babcock and E. T. Young a plot of ground near the Erie crossing on Canisteo St., on which they will at once commence the erection of a brewery, five stories high.

LOCKPORT, N. Y.—The Traders' Paper Co. has commenced the preliminary work toward establishing its plant in East Lockport, and will soon erect the main building, which will be 450 × 50 ft., and built of brick and stone. The company is capitalized at $300,000, and expects to be in operation before spring. Pres., James A. Roberts, of Buffalo.

NEW YORK, N. Y.—Adam Happel, 65 East Third St., is reported about to erect a five-story brick factory, 50 × 75 ft., on west side of First Ave. west of 93d St., to cost $25,000; Arch., John Hauser, 1441 Third Ave.——It is reported that Cohen & Ladinski will erect a six-story brick factory and stable, 24 × 95 ft., at 175 Monroe St., to cost $16,000. Archs., Siss & Langer.——Wm. Wallace, executor of the estate of Richard Gledhill, 239 Claremont Ave., Montclair, N. J., will erect a two-story brick workshop 50 × 95 ft. at 524 34th St., to cost $6,000; Arch., U. S. Vanderbilt

WATERTOWN, N. Y.—It is reported that the Stiles Mfg. Co. will locate its plant in this city and that the necessary machinery will be purchased at once.

YONKERS, N. Y.—It is stated that Alexander Smith & Sons Carpet Co. will build a brick boiler and pump house at the moquette mills, Nepperhan Ave.

BLOOMFIELD, N. J.—A report states that work has been commenced on the extensions to the Sprague Elevator Works in Bloomfield, one building of which is to be 125 × 100 ft., and the other, 200 × 64 ft.

CORAOPOLIS, PA.—The Pittsburg Consolidated Gas & Lamp Co., with offices on Wood St., Pittsburg, and works at Fostoria, O., has purchased land fronting on the river and railway in this place with a view of locating their entire plant, now at Fostoria, here. The ground is being put in shape for the erection of the buildings, which are expected to be ready for occupancy by Jan. 1.

HAZLETON, PA.—The Hazleton board of trade is making efforts to erect a building for a silk mill, at a cost of $25,000, and it is stated that Bethlehem capitalists will equip the same with machinery costing $85,000.

NEW BRIGHTON, PA.—A press report states that L. A. Stuyvesant and J. C. Vangleet, of Albany, N. Y., are looking for a suitable site for an asbestos factory, and are backed by a party of Albany capitalists that propose erecting a factory somewhere in the vicinity of Pittsburg, which will employ 200 men.

NEW HOLLAND, PA.—Abram M. Zimmerman, of Blue Ball, has purchased ground at the intersection of Luther Ave. and Conestoga St., on which, it is stated, he will erect a two-story machine shop, 35 × 40 ft.

PHILADELPHIA, PA.—A press report states that plans are being prepared by Hales & Ballinger for a large textile mill to be built at 11th St. and Washington Ave., providing for a six-story building, 236 × 66 ft., with an ell, 66 × 116 ft.

PHILADELPHIA, PA.—W. W. Gibbs, Pres. Electric Storage Battery Co., of this city, has been investigating the advantages for establishing an immense storage battery plant at Niagara Falls, N. Y. Mr. Gibbs states that the building of another manufactory has been made necessary, and that it will probably be located at Niagara Falls.

READING, PA.—J. H. Sternbergh & Sons, proprietors of the bolt and nut works at Third and Buttonwood Sts., have just awarded the contracts for a rolling mill, 80 × 200 ft., at Fourth and Buttonwood Sts.

WARREN, PA.—The new buildings for the Hazeltine woolen mills are about completed; the main structure is 120 × 40 ft. and three stories high; the dry house is 40 × 50 ft.; the dye and pick houses will soon be erected. New and improved machinery will be added to the plant, which will include a 25-HP. boiler and engine and equipment for an electric light plant.

WAYNE JUNCTION, PA.—Report states that plans are being prepared for a large paper box and wall paper factory to be built at this place.

WEST NEWTON, PA.—It is understood that a factory for the manufacture of agricultural implements will be erected at this place by New York capitalists.

WILLIAMSPORT, PA.—Bennett & Rothrock, contractors, will build at once two buildings for the Rickus Mfg. Co., one 60 × 100 ft., and the other 35 × 125 ft. The company has just completed an addition 35 × 75 ft., and the total additional floor space will be about 13,000 sq. ft. The company has in contemplation the erection of a six-story addition on Locust St., 300 × 150 ft., to be built next spring, and to be used for the finishing, decorating, shipping and storage departments; one feature of this structure will be a car elevator of sufficient capacity to lift and carry freight cars to each floor.

WILMINGTON, DEL.—It is reported that the McDaniel & Merrihew Co., of this city, will erect a factory for the manufacture of bicycles.

ALEXANDRIA, VA.—It is understood that parties are buying land near this city who are agents of the Southern Railway Co., and that work shops will be established on an extensive scale.

FOUNTAIN HILL, VA.—E. Lipps, of the Lehigh silk mills, will build and equip another factory, 240 × 145 ft., at this place.

CHARLOTTE, N. C.—Geo. M. Care and J. Elwood Cox, the latter of High Point, N. C., will establish at once at this place a shuttle block factory.

FAYETTEVILLE, N. C.—A $50,000 cotton mill, in addition to the one to be built by the Messrs. Holt, of Burlington, N. C., is to be built at this place and equipped with an electric light plant.

RALEIGH, N. C.—Press reports state that James Webb, Jr., of Hillsboro, is president of the cotton mill company that is soon to build a $100,000 factory at Hillsboro. Work will be begun next month.

SPRAY, N. C.—A 10,000-spindle cotton mill is to be built at this place, in Rockingham county, N. C., at an early day, and the company is now being formed.

STATESVILLE, N. C.—Another roller flour mill is to be built at this place soon by the parties who recently built the present one.

COLUMBIA, S. C.—An application has been made for a commission to organize the Broad River Mills Co., which proposes to manufacture cotton goods in or near the city; capital stock to be $150,000. The company will operate 20,000 spindles. Address W. B. S. Whaley.

GREEN DEPOT, S.C.—The Victor Mfg. Co. is erecting a new mill, to cost $50,000. New machinery will soon be purchased.

ATLANTA, GA.—H. T. Inman and W. N. Nixon are organizing a company to build and equip a woollen mill at this place.

LITHONIA, GA.—Press reports state that the citizens are agitating the subject of building a cotton factory.

NEW ORLEANS, LA.—It is stated that Petty & Sayers, proprietors of the planing mill on South Market St., will enlarge their plant. The new building will be of brick, 30 × 50 ft.

SPRINGFIELD, O.—The Rogers Iron Co. is reported as erecting an addition to its buildings, 100 × 62 ft., to be used as a machine shop; the walls will be of stone, with iron supports, and the roof will be of iron.——The Champion City Brewing Co. is being organized and will build a plant at an early date; capital stock will be $100,000, of which $40,000 has been subscribed.

BREMEN, IND.—It is reported that the Holland Radiator Works, which were recently burned, will be rebuilt.

INDIANAPOLIS, IND.—The Citizens' St. R. R. Co. will soon erect additional buildings and will build its own cars. Additional machinery will be required, part of which has already been purchased of Wright & Wright.

DETROIT, MICH.—McRae-Roberts Mfg. Co., of this city, will commence at once the erection of a three-story brick factory, 50 × 100 ft., and a molding-room of the same size; the firm manufactures fine brass goods.

GRAND RAPIDS, MICH.—The Buss Machine Works is said to be arranging to erect an additional brick factory building.

GRAND RAPIDS, MICH.—Reports state that A. T. Driggs, of the H. B. Feather Co., is organizing a company to manufacture wire.

MANISTEE, MICH.—A report states that J. B. Collins has decided to locate a silk manufacturing plant in this place, with a capacity of 500 silk looms.

SAGINAW, MICH.—It is understood that the Keystone Mfg. Co. has been reorganized and will spend $100,000 in enlarging its plant at an early date.

SAGINAW, MICH.—It is reported that the Bright Star Foundry Co. will remove from Hemlock City to this city, and will occupy a building 60 × 200 ft., which is to be erected as soon as possible.

AURORA, ILL.—Press reports quote John Linden, Treas. Aurora Iron Works, as stating that the Flush Tank Co., of Richmond, Ind., will probably move to this city. By the terms of the contract, the company will lease buildings of the Aurora Iron Works, and the latter concern will do the foundry work; the Iron Co. will construct a machine shop at once, 28 × 94 ft., for use of the new concern, and will also enlarge its present foundry capacity.

CANTON, ILL.—A press report states that the plant of the Enterprise Iron Works, which was recently destroyed by fire, will be rebuilt. The works consisted of a foundry and machine shop, and the proprietors are Savill & Sullivan.

CHICAGO, ILL.—It is reported that the National Linseed Oil Co., 1285 Old Colony Bldg., will erect a three-story and basement factory, 108 × 20 ft., of brick and stone at 46 Stewart Ave. Archs., Thomas Clark & Sons, 175 Aberdeen St.

HEYWORTH, ILL.—J. A. Humphrey's grain elevator and electric light plant were recently burned; reported loss, about $40,000.

MACOMB, ILL.—A report states that the plant formerly owned by the Macomb Wagon Co. has been purchased by W. H. Cooper & Sons, of Coffeen, Ill., and will be remodeled for the manufacture of sawmill machinery.

BELOIT, WIS.—Thompson & Sons are said to be about to add new buildings to their shops.——The Beloit Iron Works is building new shops, and will add new machinery.——The Besley Tool Works will soon add a steam engine to its plant.

RACINE, WIS.—It is reported that negotiations are pending for the rebuilding of the Racine Refrigerator Works, that were recently burned.——It is reported that a manufacturing plant is to be established in this city for the manufacture of the Oliver typewriter, if $50,000 can be raised here, and a committee has been appointed to solicit stock.

STEVENS' POINT, WIS.—A press report states that John Strange, a Menasha capitalist, will locate a new paper mill here if $125,000 can be raised and the outlook is favorable.

WAUSAU, WIS.—The National Brewing Co. will erect a two-story brick and stone machine and boiler house, 35 × 50 ft., to cost $12,000. Archs., Wilhelm Griesser Engineering Co., 907-103 Randolph St.

DAVENPORT, IA.—It is reported that the Sylvan Steel Co. is erecting an addition to its rolling mills, 225 × 420 ft., to contain a second train of 16-in. rolls, for rolling plow beams, rounds and flats, light rails, etc.; the new 8-in. train has just been completed and started. A 40 × 160-ft. building is also to be erected as a scrap shed.

DULUTH, MINN.—The Ironton Structural Steel Co. is having plans and specifications made for proposed improvements. Two open-hearth furnaces will be added and several heating ovens in the rolling mill; also slabbing machinery will be put in.

MINNEAPOLIS, MINN.—It is reported that the Holt Ice & Cold Storage Co., which was recently organized with a capital stock of $200,000, with Sterling R. Holt as President, will break ground at once for a plant to cost $125,000.

WASECA, MINN.—At a recent meeting of the citizens it was decided to accept a proposition of J. K. Brady, of Dodge Center, to erect and operate a tow mill in this city.

ST. LOUIS, MO.—The plants of the Allen-Pfeffer Mfg. Co. and the Vane Calumet Paint Co. in North Main St. were recently reported destroyed by fire; reported loss, about $50,000.——Wm. Summersville, 3641 Cozens Ave., is said to have purchased a factory site in East St. Louis for $56,000, and is about to erect a manufacturing building.

ST. LOUIS, MO.—A press report states that Friedman & Schafer are having plans drawn for a new shoe manufacturing plant to be 100 × 140 ft., 10 stories high, and to cost, including machinery, $250,000.——Reports state that Shickle, Harrison & Howard Co., manufacturers of architectural iron, will build a large plant at Clifton Heights; in the main plant, car couplers and bolsters and steel motor gear for street cars will be made; there will also be a jobbing and large machine shop, for cutting out and making street railway motors; and iron pipe of all dimensions will be cast in a separate foundry. Construction of buildings will be begun in the spring. Machinery will be new throughout and will be operated by electricity.

MISCELLANEOUS CONTRACTS AND SUPPLIES.

STONE CRUSHER.—Middletown, Conn.—The selectmen are reported as discussing the purchase of a stone crusher.

ARTIFICIAL LAKE.—St. Louis, Mo.—Bids are asked until Nov. 5 for constructing a lake in O'Fallon Park. E. S. Foster, Secy. Bd. Pub. Improvements.

PIER WORK.—Philadelphia, Pa.—Bids are asked by the state quarantine board until Nov. 4 for building a pier at Marcus Hook, Pa. Benj. Lee, Secy., Bullitt Bldg.

FURNITURE AND FIXTURES.—Fairfax, Va.—Bids are asked until Nov. 11 for furnishing furniture and fixtures, as stated in our advertising columns. F. W. Richardson, County Clk.

GRANITE PEDESTAL.—Washington, D. C.—Bids are asked until Nov. 27 for furnishing and erecting a granite pedestal for the statue of Dr. Samuel D. Goss. Col. John M. Wilson, U. S. Engrs.

DAM.—Lewiston, Me.—Libby & Dingley, of this city, are reported to have engaged W. R. Welds, of Livermore Falls, Me., to build a dam 12 ft. high at the gulf on the Androscoggin River above this city. The preliminary work is now being done.

WATER TOWER.—Indianapolis, Ind.—Our correspondent writes us that the board of safety has voted to purchase a water tower, and that the board of public works will probably order plans and specifications, and soon ask for bids for the water tower.

PUMPING PLANT.—Brooklyn, N. Y.—Commodore E. O. Matthews, Ch. of Bureau of Yards and Docks, Washington, informs us that the bids for a pumping plant at the Brooklyn navy yard were not opened Oct. 23, and that new specifications will probably be prepared and the work readvertised. The last congress made an appropriation of $60,000 for this work.

DRAINAGE.—Winnipeg, Man.—The contract for the draining of the St. Andrew's marsh has been let to C. Whitehead & Co., of Brandon, at $91,760. There were two other bids, one from S. Gaudaur, of St. Boniface, and the other from J. Kennedy, of Fargo. The work will require about 850,000 cu. yds. of excavation.

TELEPHONE FRANCHISE.—Newark, O.—The county commissioners have granted the Newark Telephone Co. a franchise for a telephone line from Granville along the public road through Alexandria, Johnstown and Hartford to the north line of Licking county, and along the road known as Alexandria, Johnstown, Hartford and Centerburg road.

TELEPHONE COMPANY.—Oconto, Wis.—The Oconto Telephone Co. has been incorporated, with a capital stock of $7,500, by Judge D. G. Classon, Dr. C. W. Stoelting and A. H. Luckenbach. A franchise will be asked at once, and it is expected that the system will be in operation in this city by Dec. 31, and that it will be extended to other places.

STATE CANAL WORK.—Albany, N. Y.—The lowest bid received Oct. 18 for piling and protecting the banks of the Shinnecock & Peconic Canal, as advertised in Engineering News, was that of P. J. Brummelkamp, of Syracuse, at $10,672. M. J. Dady, of Brooklyn, bid $12,524. P. J. Brummelkamp was also the lowest bidder for dredging the channel, at $4,800; Brainard Bros., of New York, bidding $5,440. Geo. W. Aldridge, Supt. Pub. Wks.

STEAM ROAD ROLLER.—Kansas City, Mo.—The board of public works has decided to rent an 18-ton steam roller from the O. S. Kelly Co., of Springfield, O. The local papers state that the company offered to rent either a 15-ton or 18-ton roller to the city until March 12 for $500, or until May 1 for $750. Should the city desire to purchase the roller the 15-ton one would cost $4,100, or the 18-ton roller $4,500, the amount paid for rent to be deducted from the purchase price in either case.

TELEPHONE EXTENSION.—East Liverpool, O.—A press report states that Spencer F. Quick, of Steubenville, is in this city organizing a comany of East Liverpool and Wellsville capitalists to extend the lines of the Phoenix Telephone Co., which is now putting up its lines in Steubenville, Toronto and New Cumberland. That portion of the system will be completed by Dec. 1. The East Liverpool corporation will build the line from Toronto to East Liverpool. A company will be formed at Lisbon and Salem to connect those towns with East Liverpool. It is the intention to complete the East Liverpool section by spring.

CONTRACT PRICES.

SEWERS.—Allegheny, Pa.—The contract for constructing a main sewer in McClure Ave. has been awarded to Patrick O'Donnell at $9,833, the itemized bid being as follows: 30-in. brick sewer, 630 ft., $4.60 a ft.; 24-in. pipe, 300 ft., $2; 20-in. pipe, 420 ft., $2; 18-in., 850 ft., $1.80; 15-in., 3,700 ft., 55 cts.; No. 1 inlets, 9, $16 each; manhole shafts, 12, $20 each.

CANAL.—Port Huron, Mich.—The bids opened Oct. 1, and published in our issue of Oct. 10, for a canal from Lake Huron to Black River, as advertised in Engineering News, were rejected, and the following bids were received Oct. 18 for a smaller canal by the same routes, the new bids being for a canal 25 ft. wide on bottom, 6 ft. of water, with slope 1 to 1 below waterline, and 2 to 1 above waterline; Cy. Engr. W. P. Rogers:

C. E. Mitchell & Co., Ludington, Mich.—Route No. 1, $106,000; route No. 2, $117,000; timber crib protection, filled with riprap, 20 ft. wide, $23 per lin. ft.; guaranty if crib is built, $3,000 per year.

R. C. Wallace, Detroit, Mich.—Either route, $80,000, the same to include suitable protection and gates.

Geo. Lockerble, Detroit, Mich.—Either route, $85,500; no guaranty; timber crib, 25 ft. wide, filled with riprap, $75 per lin. ft.

McDonald Engineering Co., Chicago, Ill.—Route No. 1, $71,445; route No. 2, $64,000; crib protection, $2,000; guaranty, if crib protection is built, $5,000 per year.

Casgrain & McDonald, Chicago, Ill.—Route No. 1, 868,607; route No. 2, $63,315; protection to either route, including guaranty for five years, $9,000.

R. H. McWilliams & Co., Chicago, Ill.—Route No. 1, $64,900; route No. 2, $66,000; pile protection, 600 ft. long on each side, $8,000; guaranty, $2,500 for the first year, and $1,500 for each succeeding year.

M. Lally, Detroit, Mich.—Route No. 1, $61,000, including breakwater; route No. 2, $63,000, including breakwater; guaranty, $3,000 per year.

FILLING.—Detroit, Mich.—First Lieut. H. L. Roberts, U. S. Engineer Office, writes us that the contract for filling in river front at Fort Wayne, Mich., has been awarded to M. J. Griffin, the bids being as follows:

Bidder.	Per cu. yd.
Breyman Bros., Toledo, O.	$0.40
John H. Charlton, 238 Fifth St., Detroit	0.57
Thomas J. Kennedy, 64 Labrosse St., Detroit	0.54
Lennane Bros., Detroit	0.39½
Michael J. Griffin, 550 W. Fort St., Detroit	0.32¾

SEWERS.—Washington, D. C.—The following bids were received by the district commissioners Oct. 24 for constructing sewers, as advertised in Engineering News; contracts not yet awarded:

Bids Received at Washington, D. C., Oct. 24, for Constructing Sewers.

Bidder.	Excavation, per cu. yd.	Brick masonry, natural cement.	Vit. brick masonry, Portland cement.	Brookland sewer. Vit. brick invert, Portland cement.	Brookland sewer. Concrete masonry, in arch, Portland cement.	Brookland sewer. Concrete masonry in sewer, natural cement.	Brookland sewer. Concrete masonry, in place bel. arch, natural cement.	Kenesaw Ave. sewer. Brick 2.075 ft. 2¾ × 4½ ft.	Kenesaw Ave. sewer. Concrete, 2.075 ft. 2¾ × 4½ ft.	Manhole curb.
John Jacoby, Wilmington, Del.	$0.65	$9.90	$20.00	$0.85	$9.75	$6.50	$6.75	$5.49	$5.49	$35.00
Justin McCarthy, Washington, D. C.	1.45⅜	11.74½	21.00	.778	13.17½	10.14	12.17	9.04	8.21	32.50
H. L. Cranford, Washington, D. C.	.46½	9.11	17.59	.69	8.66	6.58	5.98	5.46	5.24	25.00
J. P. Largney, Washington, D. C.	.50	10.00	19.75	.87	8.95	6.95	6.30	6.10	5.85	20.00
T. M. Lesher & Son, Easton, Pa.	.46	9.42	15.30	.75	8.25	6.10	6.10	5.54	5.27	28.00
Darius Gaskins, Washington, D. C.	1.05	10.00	22.00	.90	12.00	6.50	7.25	5.60	4.85	18.00
Stratford & Hawkes, Brooklyn, N. Y.	.67	9.25	24.00	.71	10.00	7.00	7.25	4.50	4.50	30.00
Andrew Gleeson, Washington, D. C.	.39	8.69	22.23	.85	10.19	7.18	7.18	4.80	4.19	20.00
B. J. Coyle, Washington, D. C.	.40	10.00	22.00	1.00	9.00	7.00	6.30	6.90	6.40	30.00
Lyons Bros., Washington, D. C.	.85	10.00	20.75	.90	8.75	7.50	7.25	6.75	5.97	30.00
James McCandlish, Washington, D. C.	1.02	8.94	17.00	.75	7.88	6.00	6.00	5.37	4.89	27.00
M. F. Tatty, Washington, D. C.	.55	8.70	19.00	.75	7.90	6.00	5.70	5.50	4.90	25.00

LIGONIER BLOCK PAVING.—Allegheny, Pa.—The contract for repaving a portion of Lacock St. has been awarded to Booth & Flinn, at $20,714, the bid being as follows: Excavation, 6,000 cu. yds., 34 cts. a cu. yd.; paving with Ligonier blocks, 10,000 sq. yds., $1.72 a sq. yd.; new curb, 100 lin. ft., 48 cts. a lin. ft.; curb reset and redressed, 100 lin. ft., 18 cts.; granite crossings, 2,000 lin. ft., 70 cts. a lin. ft.; crossings reset and redressed, 100 lin. ft., 8 cts.

MACADAMIZING.—New Brunswick, N. J.—The board of freeholders opened the following bids at New Market Oct. 18 for constructing a macadam road between Stelton and Dunellen, estimated to cost $30,000: H. S. Wilson, Newark, 70 cts. a sq. yd.; Mr. Harigrove, of Newark, 70 cts.; Hellpot & Ayers, Bound Brook, N. J., 78½ cts.; Kerher & Allen, Trenton, 93 cts.; J. F. Shandley & Bro., Newark, 89 cts.; A. & A. D. Aikenson, New Brunswick, 79 cts.

IRRIGATION CANAL.—Ogden, Utah.—The Pioneer Electric Power Co., of Ogden, has commenced the construction of its irrigation canal, lying west and northwest of Ogden, and on the north side of the Weber River. The power project of this company was described in our issue of Nov. 8, 1894, and the irrigation part of the enterprise was mentioned at the close of the article. The company purchased the Fremont Park Canal, with its water rights, also all the water of Four-Mile Creek, and is remodeling and enlarging the canal, using entirely new construction much of the way. The canal will draw water from Weber River and from Mill and Four-Mile creeks. About 13 miles of main canal and several laterals will form part of the system. The canal will have a capacity of 130 cu. ft. per second, and is intended for the irrigation of 18,000 acres of land. The contract for constructing the canal was awarded Oct. 9 to Carey Bros., of Ogden. The estimated quantities, with prices, were as follows: Earth excavation and embankment, 100,000 cu. yds., at 8¼ cts.; loose rock excavation, 100 cu.

yds., 28 cts.; solid rock excavation, 100 cu. yds., 75 cts.; overhaul (limit of haul 500 ft.), at 1½ cts. per cu. yd. per 100 ft.; excavation for foundations of structures, including backfilling, at 40 cts. per yd.; piling, driven and cut off, 756 lin. ft., at 40 cts.; lumber in flumes and headgates, erected and complete, 60,000 ft. B. M., at $35; iron, 2,500 lbs., at 5 cts.; clearing, 8½ acres, at $25; grubbing, 2 acres, at $90; total, $11,273. The contract calls for completion by Dec. 31, 1895. Ch. Engr., C. K. Bannister; Eng. in Charge, W. F. Hardesty.

SUBWAY.—Boston, Mass.—B. Leighton Beal, Secy. Boston Transit Comm., informs us that the following bids were received Oct. 17 for constructing Section 3 of the subway, as advertised in Engineering News:

Bids Received Oct. 17, 1895, for Constructing Section 3 of the Subway, Boston, Mass.

Quantities.		Herbert Stewart, 7th Ave. & 15th St., New York.	Metropolitan Const'n Co., 95 Milk St., Boston, Mass.	Jones & Mechlin, Boston, Mass.	Campbell, Blair, Hutchins & Co., 802 Marquette Bldg., Chicago, Ill.	Elw. W. Eversom, Providence, R. I.	Fred'k E. Shaw, Box 1289, Providence, R. I.
Earth excavation	51,000 cu. yds.	$0.90	$0.56½	$0.60	$0.57	$0.60	$0.50
Surplus earth removed to Common, etc.	5,000 " "	.15	.40	.20	.30	.20	.10
Removing surplus earth, ½-mile haul	.....	.20	.01	.20	.23	.12	.10
Rem'v'g surplus earth each ad't'l ¼ mile	.....	.05	.22	.10	.10	.05	.04
Surplus earth, 1-mile average haul	38,000 cu. yds.	.30	.45	.40	.43	.22	.18
Iron and steel work; setting and securing	1,250 tons	7.00	8.00	5.00	5.50	5.00	5.00
Brick masonry, American cement	100 cu. yds.	12.00	12.00	12.00	12.00	11.00	11.00
Brick masonry, Portland cement	900 " "	14.00	14.00	14.00	13.50	13.50	13.00
Concrete masonry, Port. cem. (com. walls)	1,200 " "	9.00	7.50	8.00	7.00	7.50	8.00
Concrete masonry, Portland cement	5,800 " "	7.00	7.00	7.00	6.00	7.00	7.50
Basement stone masonry, Amer. cement	100 " "	10.00	8.50	6.50	7.00	9.00	8.00
Basement stone masonry, Port. cement	100 " "	11.00	9.00	7.00	7.50	10.00	9.00
Granite footing stones	350 " "	20.00	36.00	30.00	27.50	27.00	24.00
Tiling on roof of subway	120 " "	5.00	8.50	6.00	9.75	8.00	6.00
Tiling on sides of subway	40 " "	5.00	10.00	6.00	10.75	10.00	6.00
Waterproof coating	9,800 sq. "	.35	.40	.25	.12½	.20	.12
Totals	.....	$145,330	$141,005	$132,310	$124,235	$123,730	$117,226

SEWERS.—Erie, Pa.—Bids were received by Geo. Platt, Cy. Engr., Oct. 21, for two 15-in. tile sewers in State St., one on each side of street, average cut of 13½ ft., and also for one 24-in. double-strength tile sewer in the same street, average cut of 14.7 ft. The bids include relaying of stone pavement after the sewer is completed, and were as follows, all the bidders being residents of Erie:

Quantities.		J. D. Sullivan.	E. Driscoll.	S. J. Eustice.	B. J. Murphy.	J. McCormick & Son.
For two 15-in. sewers:						
15-in. sewer and brnchs.	3,840 ft.	.....	$1.75	$0.98	$1.25	$2.25
9-in. pipe, in spills	150 "	.....	.35	.50	.75	.40
6-in. pipe, in new conn's	.....	.....	.30	.60	.50	.30
Manholes	12	.....	45.00	28.00	40.00	37.00
Catchbasins	14	.....	30.00	23.00	40.00	30.00
6-in. pipe, old conn's	520 ft.	.....	.35	.20	.35	.40
9-in. pipe, old spills*	100 "	.....	.45	.25	.50	.40
For one 24-in. sewer:						
24-in. pipe, and brnchs.	1,920 ft.	$2,70	3.00	3.25	3.00	3.45
9-in. pipe, in spills	150 "	.55	.60	.30	.75	.45
6-in. pipe, in new conn's	.....	.55	.30	.22	.25	.35
Manholes	6	25.00	45.00	30.00	40.00	39.00
Catchbasins	14	25.00	35.00	25.00	40.00	35.00
6-in. pipe, old conn's	520 ft.	.35	.35	.22	.50	.40
9-in. pipe, old spills*	100 "	.35	.40	.25	.75	.40

* 9-in. pipe connecting old spills with new sewer.

Bidder.	Total. Two 15-in. sewers.	One 24-in. sewer.
John D. Sullivan	.....	$5,984
E. Driscoll	$7,960	6,832
S. J. Eustice	4,625	6,954
B. J. Murphy	6,185	7,008
J. McCormick & Son	9,812	7,664

PUMPING ENGINES.—Washington, D. C.—The following bids were received Oct. 21, according to reports, for an 8,000,000-gallon pumping engine, with boilers, etc., for the U St. pumping station, as advertised in Engineering News:

Groshon High-Duty Pumping Engine Co., New York city, triple-expansion, vertical crank engine, $34,000; time, 300 days; coal consumption per day, 12,400 lbs.; supplemental bids, $33,200, $35,165, $35,765 and $34,000.

Nordberg Mfg. Co., Milwaukee, Wis., triple-expansion, horizontal engine, $40,650; time, 200 days; coal consumption, 12,500 lbs.; supplemental bids, with Green's fuel economizer, $41,650 and $43,000; coal consumption per day, 11,750 and 11,500 lbs.; with Campbell & Zell boilers, $42,000.

Holly Mfg. Co., Lockport, N. Y., triple-expansion, vertical engine, $35,000; time, 150 days; coal consumption, 11,070 lbs. per day; supplemental bids, bidder's specifications, $32,500; coal consumption, 11,496 lbs.; Sterling National boilers, $725 additional; Hine Supply Co. boilers, $1,405; Campbell & Zell boilers, $2,402; Babcock & Wheeler boilers, $2,970 additional.

Pennsylvania Iron Works, Philadelphia, Pa., triple-expansion engine, $84,100; time, 8 months; 1½ lbs. per HP. per hour coal consumption.

George F. Blake Mfg. Co., New York city, triple expansion, horizontal engine, $41,400; time, 7 months; coal consumption, 12,500 lbs. per day.

Geo. V. Cresson Co., Philadelphia, Pa., the D'Auria horizontal duplex compound engine, $30,000; time, 270 working days; coal consumption, 17,000 lbs. per day.

Arthur J. L. Loretz, Brooklyn, N. Y., triple-expansion, vertical beam, rotary engine, $39,000; time, 150 days; coal consumption, 12,000 lbs. per day.

Snow Steam Pump Works, Buffalo, N. Y., triple-expansion, horizontal engine, $29,993; time, 300 days; coal consumption, 13,730 lbs. per day.

Fraser & Chalmers, Chicago, Ill., Corliss, F. & C. vertical engine, $47,250; time, 6 months; coal consumption, 11,000 lbs. per day; Riedler horizontal F. & C. Corliss engine, $37,500; time, 160 days; coal consumption, 11,300 lbs. per day.

Henry R. Worthington, Brooklyn, N. Y., Worthington triple expansion, horizontal engine, $29,750; time, 180 days; coal consumption, 11,088 lbs. per day.

REMOVING OLD STATION, ETC.—Brooklyn, N. Y.—The trustees of the New York & Brooklyn Bridge have awarded the contract for removing the iron from the old station building on Sands St. to F. W. Sugrist, of New York, who agrees to pay $18.50 a ton for the same, according to local papers. The contract for 600,000 ft. of pine flooring, etc., for the New York station was awarded to E. M. Ressique, of Brooklyn, at $21 per 1,000 ft.

ARTESIAN WELL.—Jacksonville, Fla.—Local papers state that the following bids have been received for sinking a 12-in. artesian well 900 ft. deep: Hugh Partridge, of Jacksonville, $5,200; for a 900-ft. well, casing below 500 ft., $2.25 per ft.; additional depth below 900 ft., $6.25 per ft.; deduct for casing, $2.30 per ft. W. H. Gray & Bro., of Chicago, Ill., $5,712, or $5.95 per ft.; casing below 500 ft., $2.25; additional depth below 900 ft., $5.95; deduct for casing, $2.25. C. A. Ray, East Providence, R. I., $5,664, or $5.90 per ft. E. J. Joyce, St. Augustine, $4.25 per ft. for a depth of 900 ft.; casing below 500 ft., $2.50 per ft.; additional depth below 900 ft., $4.25 per ft. B. S. Partridge, Jacksonville, $3,839; casing below 500 ft., $3.50; each additional foot below 900 ft., $6.

SEWERS.—Bath-on-Hudson, N. Y.—J. B. McNary, Village Clk., writes us that the following bids were received Oct. 7 for constructing an 8-in. salt-glazed vitrified tile sewer, all the bidders being residents of this village: James Hutchinson, 36 cts. per ft. for 600 ft. of sewer, and 75 cts. extra for each Y-branch; A. J. Cowan, 35 cts. and 43 cts.; F. Q. Smith and Heinrich Babe, 35 cts. and 70 cts.; Peter Finkle, 38 cts. and 45 cts.; Wm. Welfinger, 35 cts. and 70 cts.; John Burdick, 38 cts. and 70 cts.

SEWERS.—Sharon, Pa.—The total bids received for constructing sewers, as advertised in Engineering News, were published Oct. 17 under Sewerage. Alexander Potter, Engr., informs us that the contract was awarded to J. V. Rose, and that the itemized bids were as follows:

Formal Bids Received Oct. 11, 1895, for Construction of Sharon, Pa., Sewers.

Quantities.		Engineer's estimate, $20,748.	McClarry & McDowell, Akron, O., $19,772.	J. V. Rose, Sharon, Pa., $20,254.	Prout & Swanson, Jamestown, N. Y., $22,447.	Lilpardt & Winterhalter, Detroit, Mich., $22,819.	O'Donnell & Vetter, Youngstown, O., $22,597.	W. J. Barry, Bellaire, O., $23,867.	Sloan, McIlvain & Ott Bros., Allegheny, Pa., $23,733.	W. J. Dunn, Pittsburg, Pa., $24,334.	W. McIntyre & W. B. Connell, Sharon, Pa., $25,745.	J. W. Kelly, New Brighton, Pa., $28,570.	J. Jenkens, Wilmington, Del., $30,190.
Pipe sewers:													
8-in., under 8 ft. deep	4,000 ft.	$0.35	$0.30	$0.35	$0.44	$0.46	$0.35	$0.37	$0.38	$0.40	$0.37½	$0.47	$0.40
8-in., 8 to 10 " "	700 "	.40	.40	.40	.51	.61	.35	.40	.42	.46	.43½	.59	.50
10-in., under 8 " "	3,000 "	.40	.35	.44	.49	.50	.40	.48	.50	.45	.41¼	.54	.52
10-in., 8 to 10 " "	650 "	.47	.45	.47	.52	.64	.40	.48	.55	.51	.47½	.74	.60
10-in., 10 to 12 " "	100 "	.58	.80	.50	.59	.72	.48	.50	.60	.65	.62½	.89	.65
12-in., 6 to 8 " "	1,425 "	.50	.40	.51	.54	.60	.48	.54	.63	.55	.51¼	.76	.65
15-in., under 8 " "	400 "	.60	.45	.65	.58	.78	.58	.60	.75	.75	.59½	.87	.74
18-in., under 8 " "	1,200 "	.80	.60	.72	.82	.83	.70	.91	.90	.95	.68½	.99	.90
18-in., 8 to 10 " "	140 "	.90	.80	.77	.85	.96	.70	1.00	.94	1.00	.94¼	1.17	1.28
24-in., 6 to 8 " "	1,970 "	1.35	.90	1.04	1.35	1.22	1.20	1.50	1.33	1.00	1.09¾	1.38	1.50
30-in., 6 to 8 " "	1,300 "	2.20	2.05	2.10	2.30	2.49	2.92	2.75	2.85	3.77	2.32	3.50	3.00
30-in., 8 to 10 " "	300 "	2.40	2.25	2.25	2.42	2.75	3.00	2.50	3.00	4.07	2.44	3.69	3.15
30-in., 10 to 14 " "	200 "	2.60	2.50	2.35	2.45	3.21	3.25	2.50	3.35	4.47	2.87	4.00	3.65
8-in. x 6-in. Y's	188	.30	.16	.28	.26	.21	.72	.22½	.18	.30	.96¾	.55	.40
10-in. x 6-in. "	140	.33	.23	.44	.38	.30	1.10	.32½	.24	.45	1.13¾	.80	.60
12-in. x 6-in. "	64	.40	.30	.57	.50	.39	1.25	.42½	.36	.55	1.31¼	1.08	.78
15-in. x 6-in. "	16	.60	.53	.84	.74	.58	1.65	.62½	.62	.75	1.74	1.66	1.27
18-in. x 6-in. "	52	.90	.73	1.14	.92	.76	2.00	1.27	.85	1.10	2.16¾	1.83	1.50
24-in. x 6-in. "	80	1.60	1.50	2.19	1.94	1.46	3.95	2.44	1.62	2.00	3.73½	3.73	3.12
30-in. x 6-in. "	72	4.15	4.15	3.71	4.15	4.20	6.25	4 61	3.95	7.00	8.38½	11.52	5.00
Brick sewers:													
26 x 39-in., 6 to 10 ft. deep	500 ft.	2.60	3.00	2.80	2.47	2.70	2.68	2.85	2.94	3.00	3.00	3.75	4.25
28 x 42-in., 6 to 10 " "	220 "	2.90	3.10	3.17	2.98	3.10	2.92	2.85	2.96	3.15	3.21	3.92	4.50
40 x 60-in., under 8 " "	800 "	3.20	3.90	3.43	3.47	3.60	3.60	5.00	3.94	3.87	4.08	4.96	6.50
40 x 60-in., 8 to 12 " "	200 "	3.60	4.25	3.55	3.50	4.10	3.60	5.00	4.44	4.10	4.38	5.18	7.00
Rock excavation, cu. yds.	300	2.00	2.50	1.50	3.00	2.50	1.25	3.00	1.50	1.50	3.50	2.00	2.75
Flush tanks, brickwork	7, each.	30.00	30.00	40.00	60.00	30.00	35.00	50.00	55.00	30.00	40.00	40.00	125.00
Manholes, under 10 ft.	29 "	30.00	25.00	27.50	35.00	30.00	25.00	20.00	23.00	20.00	34.00	25.00	35.00
Manholes, over 10 ft.	10, per ft.	3.00	2.50	3.50	4.50	3.00	3.00	2.00	27.00	2.00	34.00	3.00	39.00
Intersection manholes	2, each.	8.00	10.00	5.00	15.00	5.00	30.00	20.00	33.00	10.00	55.00	15.00	42.00
Drop manhole, per ft. drop	1	.50	.50	.15	1.00	.50	3.00	30.00	2.00	.60	5.00	3.50	4.50
Deep cut connections	50 ft.	.20	.25	.12	.50	.10	1.00	.15	.60	.40	.30	.75	.20
Lampholes	5, each.	8.00	10.00	10.00	6.00	10.00	10.00	.50	5.00	10.00	8.00	6.50	5.00
Catchbasins	13 "	45.00	40.00	50.00	25.00	30.00	30.00	2.00	60.00	35.00	37.00	35.00	35.00
Uncoursed rubble mas., cu. yd.	20	4.50	4.00	2.75	5.00	5.00	3.50	3.00	3.50	3.50	6.00	5.00	12.00
Concrete, per cu. yd.	5	4.50	5.00	3.00	4.00	3.00	4.00	4.00	4.00	5.00	7.00	4.50	10.00
C. I. covers for manholes,	21,500 lbs.	.01½	.02½	.01¾	.02½	.01½	.02¼	.02	.02	.01½	.02	.023	.02¼
Oak timber in foundation	1,000 ft.	20.00	15.00	17.00	22.00	20.00	25.00	20.00	25.00	35.00	30.00	30.00	16.00
Sheathing in trench per M. ft.	4,000 "	15.00	1.00	14.00	12.00	20.00	15.00	1.00	13.00	15.00	20.00	30.00	10.00

PILE BANK PROTECTION.—Indianapolis, Ind.—The following bids were received Oct. 24 for pile bank protection on Fall Creek: Hege & Sebern, piling, 40 cts. a ft.; timber, $35 per M.; relaying stone, 33 a cu. yd.; furnishing and laying new stone, $5 a cu. yd.; A. A. McCray, 34 cts., $28, $1.50, and $2.40, respectively; Delaney & Dawson, of Cincinnati, 26 cts., $24, $12, and $1.60. The work is about 880 ft. long, with about 221 piles, 26 ft. long, 5,746 lin. ft., 5,380 ft. B. M. of timber, in pieces 4 ins. × 6 ins × 12 ft., and 36,960 ft. B. M. of sheeting, 3 in. × 12 ins. × 14 ft. B. J. T. Jeup, Acting Cy. Engr.

SEWERS.—Frankfort, Ind.—Alonzo J. Hammond, Cy. Engr., has sent us a statement of the itemized bids received Oct. 22 for constructing three pipe sewers, the bids received for the work in West Clinton St. being as follows:

Bidders.	10-in. pipe, 2,871 ft.	6-in. pipe, 1,461 ft.	Manholes, 6	Lampholes, 4	Flush tanks, 2
Porter, Boulin & Hadley, Tipton, Ind.	$0.52	$0.44	$20	$8	$65
Walker & Robinson, Troy, O.	.50	.43	25	7	70
Michael, Holleran & Co., Noblesville	.59	.39	30	11	70
Capitol Pav'g & Const'n Co., Ind'apolis	.71	.71	35	30	125
D. De Ruiter, Indianapolis, Ind.	.60	.34	25	10	80
Jenkins & Brown, Frankfort, Ind.	.73	.55	28	8	65
J. H. Fife, Oshkosh, Wis.	.70	.65	30	15	50
Ross & Hedgcock, Frankfort, Ind.	.625	.525	30	6	76
Madlem & Fink, Goshen, Ind.	.475	.275	30	7	73
F. H. Cooper, Terre Haute, Ind.	.50	.28	30	9	74
Fries, Barr & Co., Greenfield, Ind.	.59	.52	30	10	70

METAL MARKET PRICES.

LEAD.—New York: 3.3 to 3.5 cts. Chicago: 3.15 to 3.17 cts. St. Louis: 3 to 3.05 cts.

BARB WIRE.—Pittsburg: $2.70 and $2.80 for galvanized, and $2.30 and $2.40 for painted in carload and less than carload lots at mill.

FOUNDRY AND PIG IRON.—New York: $12.50 to $14.50. Pittsburg: $13 to $15.25. Chicago: $13 to $15.50.

TRACK MATERIAL.—New York: angle bars, 1.45 to 1.5 cts.; spikes, 1.8 to 1.85 cts.; track bolts, 2.15 to 2.25 cts. with square, and 2.25 to 2.4 cts. with hexagon nuts. Chicago: angle bars, 1.65 to 1.8 cts.; spikes, 1.9 to 2 cts.; track bolts, 2.3 to 2.45 cts. with square and 2.5 to 2.6 cts. with hexagon nuts.

NAILS.—Pittsburg: $2.25 per keg for carload lots and $2.35 for less than carload lots, for wire nails at mill; $1.80 and $1.85 for cut nails at mill. Chicago: $2.40 and $2.50 for wire nails, $2 and $2.05 for cut nails. New York: $2.40 and $2.50 for wire nails, and $1.95 and $2.05 for cut nails.

RAILS.—New York: $28 at eastern mills and $28.75 at tidewater; old rails, $16 to $16.50 for iron, and $13 to $13.50 for steel; light rails, $29; girder rails, $26. Pittsburg, $28 for standard sections of 45 lbs. and over; $28 for light sections; old rails, $19.75 for iron and $17 for steel. Chicago: $29 to $31 for standard sections; $28 for light sections; old rails, $17.50 to $19 for iron, and $13.50 to $15 for steel.

STRUCTURAL MATERIAL.—New York: beams, 1.75 to 2.1 cts.; channels, 1.85 to 2 cts.; angles, 1.65 to 1.8 cts.; tees, 1.9 to 2 cts.; universal mill plates, 1.75 to 1.95 cts.; steel plates, 1.75 to 2 cts. for tank, 2 to 2.1 cts. for shell, 2.1 to 2.25 cts. for flange, 2.4 to 2.5 cts. for ordinary firebox, 2.6 to 2.75 for locomotive firebox. Pittsburg: beams, 1.6 to 1.9 cts.; channels, 1.6 to 1.9 cts.; angles, 1.5 to 1.6 cts.; tees, 1.6 to 1.65 cts.; Z-bars, 1.6 to 1.65 cts.; universal mill plates, 1.8 to 1.9 cts.; steel plates, 1.7 to 1.8 cts. for tank, 1.9 to 2 cts. for shell, 1.9 to 2 cts. for flange, 2.5 cts. for ordinary firebox, 2.5 to 4 cts. for locomotive firebox. Chicago: beams, 1.8 to 1.9 cts.; channels, 1.8 to 1.9 cts.; angles, 1.75 to 1.85 cts.; tees, 1.95 to 2 cts.; universal mill plates, 2.05 to 2.15 cts.; steel plates, 2 to 2.1 cts. for tank, 2.25 to 2.35 cts. for flange, 2.8 to 2.9 cts. for ordinary firebox, 4.5 to 4.75 cts. for locomotive firebox.

INDUSTRIAL NOTES.

THE WELLS & FRENCH CO., of Chicago, Ill., is building 500 cars for the Chicago, Burlington & Quincy R. R.

THE YOUNGSTOWN BRIDGE CO., of Youngstown, O., has recently closed contracts for 10 bridges for the Cleveland, Akron & Columbus R. R.

THE CRESCENT SHIPBUILDING CO., of Elizabeth, N. J., has just shipped to parties at Ciudad Bolivar, in Venezuela, a steel stern-wheel steamer 90 ft. in length.

THE WATERTOWN STEAM ENGINE CO., of Water-

town, N. Y., has received an order from Russia for ten small oil engines, to be used in the petroleum district.

THE TOLEDO TRACTION CO., of Toledo, O., will soon commence its work on conduits, as the city has granted it a franchise for laying wires under ground.

REXFORD BROS., contractors for street improvements, Blue Island, Ill., have been awarded contracts for two sewers and a macadam road at East Chicago, Ind.

THE MIDLAND STEEL CO., of Munich, Ind., a report states, will have its new bar mill in operation by Nov. 15. At an early date another open-hearth furnace will be erected.

THE ROCHESTER BRIDGE & IRON WORKS, of Rochester, N. Y., has been awarded the contract for a wrought iron bridge over the Erie Canal at Fairport, N. Y.

C. E. AVERILL, of Omaha, Neb., has received a contract for furnishing ties, which will call for about 3,000,000 ft. of timber, 2,000,000 ft. being for the Northern Pacific R. R.

THE W. DEWEES WOOD CO., of McKeesport, Pa., is reported as increasing the size of its trimming and annealing departments, and as erecting an addition to its plant, 80 × 80 ft.

THE PULLMAN PALACE CAR CO. is building 900 freight cars for the Columbus, Hocking Valley & Toledo R. R., and 1,000 hopper-bottom cars for the Philadelphia & Reading R. R.

CAR BUILDING.—Current reports state that the number of car orders placed this year for the railways centering at Chicago has been the largest since 1893, amounting to nearly 15,000 cars.

THE WHEELER BOILER CO., of Sharon, Pa., is erecting a 325-HP. boiler for the Paxton Furnace Co., of Harrisburg, Pa., and the second 300-HP. boiler for the Thomas Furnace Co., of Niles, O.

THE CHASE PUMP CO., of Columbus, O., has added to its facilities and increased the capital stock to $50,000, of which amount $35,000 is paid in; address A. Housel, of Canton, O., or S. M. Chase, Columbus, O.

THE GOUBERT MFG. CO., of Pittsburg, Pa., has contracted to furnish the Junction Iron & Steel Co., of Mingo Junction, O., with a 1,000-HP. heater and a 14-in. separator, and 300-HP. heater to Harbison & Waer, of Pittsburg.

THE FOUNDRY OUTFITTING CO., of Detroit, Mich., is said to have closed contracts with the magnetite Foundry Co., of St. Louis, Mo., and the U. S. Boiler Co., of Cheektowaga, N. Y., for the full equipments for their new plants.

THE PITTSBURG BRIDGE CO., of Pittsburg, Pa., is building a large drawspan for the San Francisco & San Joaquin Valley Ry. Co., and has contracts for replacing some timber trestles on the Northern Pacific with steel viaducts.

THE HOLLY MFG. CO., of Lockport, N. Y., will furnish Providence, R. I., with a high-duty Holly-Gaskill pumping engine of 5,000,000 gallons capacity, and has also a contract for a 4,000,000-gallon engine of the same type for the Tiffin, O., Water Co.

THE WROUGHT IRON BRIDGE CO., of Canton, O., a report states, has a contract to erect a pipe foundry, 350 × 151 ft., for J. B. Clow & Co., at Newcomerstown, O.; the same company is also erecting a foundry and boiler shops for the York Mfg. Co., of York, Pa.

THE ENSIGN MFG. CO., of Huntington, West Va., has an order for six Russell snow plows for the New York Central & Hudson River R. R. This makes 15 entered for this season's delivery. Over a dozen railways in the United States have now purchased these plows.

H. L. WRIGHT & CO., railway contractors, of Huntington, W. Va., have made an assignment to F. M. Fulkerson, of Augusta, Ky., caused by the Chesapeake & Ohio R. R. Co. refusing to allow them full amount of measurement and for making a coping that, it is claimed, was not in the contract.

THE YOUNGSTOWN FOUNDRY CO., of Youngstown, O., which was recently organized by Messrs. Miller and McCurdy, has purchased the iron foundry interests of the Morrison Foundry & Machine Works, and has secured orders for four new housings and a 12-in. shear for the Union Iron & Steel Co.

THE COPLAY CEMENT CO., of Coplay, Pa., is erecting a large addition to its plant at that place, consisting of five new buildings 40 × 70 ft., 40 × 40 ft., 165 × 70 ft., 50 × 100 ft., and 165 × 65 ft.; the last will be four stories in height, while the others will be two-story buildings. Eight new kilns will be built.

THE FOSTORIA BOILER WORKS CO., of Fostoria, O., has filed articles of incorporation, with a capital stock of $10,000. Work will be begun at once on a building which will be 45 × 100 ft., and in the near future a machine shop will be added. Address R. H. Black, C. J. Cronin, or W. W. Stephens.

HARMAN & EVANS, Engrs., of Peoria, Ill., have the following work on hand: Water-works for Milford, Ill.; sewers at Macomb, and at Averyville, Ill., water-works and brick paving. They have also just completed the building of a one-mile race track, which necessitated the excavation of 75,000 cu. yds. of earth.

THE PENNSYLVANIA STEEL CO. is reported as having contracts to build seven steel bridges for the Pittsburg & Eastern R. R., which will involve the use of 1,500,000 lbs. of manufactured steel; also a contract for a steel coal trestle 500 ft. long for the Baltimore & Ohio R. R., to be erected at Cumberland, Md.

THE AKRON TOOL CO., of Akron, O., is reported as turning out an order for a dozen of its McNeil patent-balanced, automatic dump-charging barrows for the Salem Iron Co., Leetonia, O., for handling coke; and is also making some large, extra heavy barrows for the Erie Gas Co. and People's Gas Co., of Cleveland, O.

THE ENTERPRISE BOILER WORKS, of Youngstown, O., is reported as having completed a furnace at Struthers for the Brown-Bonnell Iron Co., a Massick & Crook stove for the Mahoning Valley Iron Co., a 150-ft. stack for the Junction Iron & Steel Co., at Mingo Junction, O., and several 100-ft. stacks for the Monongahela Furnaces, at McKeesport, Pa.

JOSEPH G. FALCON, 1110 Ayers Court, Evanston, Ill., has completed the laying of a 16-in. cast iron water main across the Kennebec River, which is to stand a pressure of 150 lbs. to the sq. in. The Falcon flexible joint was used throughout, and the pipe has been satisfactorily tested and accepted. Mr. Falcon's address will be Evanston, Ill., instead of Bath, Me., as heretofore.

THE SHERIFF MACHINERY CO., of Pittsburg, Pa., recently placed, among other orders, the following engines: A 12 × 12 O. & S. engine in the plant of the Bellaire Nail Works Co., at Martin's Ferry, O.; a 6 × 7 engine in the plant of Wm. Clark's Son & Co., Pittsburg; a 10 × 10 engine for the Leechburg (Pa.) Foundry & Machine Co., and a 10 × 10 engine for the Frank-Kneeland Machine Co., Pittsburg.

THE SHICKLE, HARRISON & HOWARD IRON CO., St. Louis, Mo., proposes removing its entire plant, including the pipe foundry and steel works, to Clifton Heights, near St. Louis. J. M. Harrison, Secy., is also quoted as stating that the new plant will be operated by electricity throughout. In the steel department the principal specialties are car couplers, body bolsters for car trucks, and steel motor gears for street cars.

THE BERLIN IRON BRIDGE CO., of East Berlin, Conn., has lately completed for Wilmot & Hobbs, of Bridgeport, Conn., a new rolling mill to take the place of the one lately destroyed by fire; the main mill is 126 × 200 ft., and has an engine and boiler room attached in a separate wing, 54 × 90 ft. The construction is entirely fireproof. The roof covering is the Berlin Iron Bridge Co.'s patent anti-condensation corrugated iron.

THE PITTSBURG TESTING LABORATORY, T. L. Condron, Res. Engr., Chicago, has been awarded the contract for inspecting all of the ironwork, about 2,000 tons, for the Century Bldg., St. Louis, Mo.; also for a bridge over the Illinois River for the Elgin, Joliet & Eastern R. R., and the ironwork that will be used in the temporary post office building, Chicago; the company also has a contract for inspecting all of the ironwork in the new Mabley Bldg., Detroit, Mich.

THE BROWN HOISTING & CONVEYING MACHINE CO. has sold, through its Chicago office, Marquette Bldg., Chicago, a complete tramrail conveying system for the new warehouse of the National Tube Works Co., Clark and Taylor Sts., Chicago. It will consist of steel I-beam runway, with wrought iron hangers and all necessary switches. The whole system to be equipped with six 1-ton Brown patent trolleys. The Weston triplex blocks will be used throughout.

THE LINK BELT MACHINERY CO., of Chicago, Ill., is sending out invitations to inspect the electric mining plant which it has put in for the Essen Coal Co., at Federal, Pa. The equipment of this plant consists of 16 "Independent" chain-breast mining machines, two 80-HP. "Independent" four-wheel locomotives, three 150-K-W. "Independent" mine type dynamos, a 600-HP. Russell steam engine, and the necessary wiring, switchboards, insulators, arc and incandescent lamps, etc.

THE COOK WELL CO., St. Louis, Mo., H. F. Cook, Pres., has the contract for putting down five 6-in. wells at Grand Haven, Mich., several wells for the Water Co. at Adrian, Mich., a complete water supply system for the Chicago, Burlington & Quincy R. R. at Galesburg, Ill., and a 2,000,000-gallon plant for the South Omaha (Neb.) Water Co. The company is testing the Plattsmouth, Ill., works, and has recently completed new works at Richmond, Mich., and a contract at Ypsilanti, Mich.

THE WILBRAHAM-BAKER BLOWER CO., of Philadelphia, Pa., reports trade very brisk and as full of business in all departments. The company has recently placed an order for a new pattern storage house with the Berlin Iron Bridge Co., of East Berlin, Conn. The building will be fireproof, 64 ft. wide and 86 ft. long, one story high, with brick side walls, covered with the Berlin Iron Bridge Co.'s patent anti-condensation corrugated iron roof covering.

CHARLES MILLAR & SON, selling agents for the Utica Pipe Foundry Co., of Utica, N. Y., report that they have just secured contracts for the cast iron pipe required for the construction of complete water-works systems at Theresa and Philadelphia, N. Y. They state that the closing season has been very satisfactory, as far as the volume of business is concerned, but is far from satisfactory in the matter of price, the actual advance in pig iron not being covered by the limited advance in the price of pipe.

THE GENERAL ELECTRIC CO., of Schenectady, N. Y., has commenced work on its new machine shop; the building will be 92 × 350 ft., and will contain two wide galleries extending the entire length of the shop; the main floor will be used as a testing and erecting shop, and the galleries for the construction of miscellaneous light apparatus. An annex is also to be built 50 × 80 ft., to be used for general machine work. It is stated that the new plant will be ready for occupancy by March 15, 1896.

THE SOUTHWARK FOUNDRY & MACHINE CO., of Philadelphia, Pa., is said to have received contracts to furnish Jones & Laughlins, of Pittsburg, Pa., a blowing engine to be placed in their new Bessemer plant; the engine will be of double compound condensing, quarter-crank type, and will have a 48-in. stroke and 54 × 48 air tubs; also a small engine to Julian Kennedy, which is to be placed in the new plant of the Apollo Iron & Steel Co., at Vandergrift, Pa., and a 24 × 30 Porter-Allen engine to the National Tube Works Co., McKeesport, Pa.

THE UNITED STATES WIND ENGINE & PUMP CO., of Batavia, Ill., has just shipped a complete water station outfit to New Zealand, consisting of a windmill mounted on a steel tower, with Halliday improved fixtures, pumps, etc.; the company has recently received a cable order for a 22-ft. diameter Halliday windmill with 60-ft. tower for a railroad at Buenos Ayres, So. America, and is also sending 10 windmills to Buenos Ayres for agricultural uses. Mr. Snow informs us that they have orders for several windmills for South Africa; also that they are building two stone towers 100 ft. high for the new water-works at Lena and Warren, Ill., and that a tank of 2,000 bbls. capacity will be placed on top of each of them

THE NATIONAL SWITCH & SIGNAL CO., of Easton, Pa., has recently been awarded the contract for putting in a tower and interlocking plant at Paxton, Ill., and also for the Armitage Ave. crossing of the Chicago Electric Ry., Chicago. The company is just commencing work on the Division St., North Ave. and Fullerton Ave. Chicago Electric Ry. crossings, in all of which Gibbs' patent crossing is to be used; and is also installing interlocking plants at North and East Grand Aves., Springfield, Ill., one for the Chicago, Peoria & St. Louis R. R., and another for the Illinois Central R. R., and is just completing plants at Carbondale, Ill., for the Illinois Central, and at Hinckley, Minn., for the St. Paul & Duluth R. R.

L. M. MOYES, of Philadelphia, Pa., patentee and manufacturer of the Combine water tube boilers, informs us that he has leased the factory premises at 1434-36 Randolph St., Philadelphia, Pa., where the manufacturing and assembling of his boiler will be carried on, and where the general offices will also be maintained. He is at present arranging for the incorporating of his business, with a view to the developing of the manufacturing department. The Combine boiler is in successful operation, and a series of tests have shown gratifying results. Mr. Moyes is at present erecting boiler plants at various points, and mentions a 200-HP. for Thos. Kelley, of Philadelphia; 100-HP. for St. Ann's Catholic schools, Philadelphia; 125-HP. for the Marietta Electric Light Co., Marietta, Pa., and 130-HP. for the Washington Agricultural College, Pullman, Wash.

THE PENN BRIDGE CO., Beaver Falls, Pa., has recently taken the following contracts: Addition to the 84-in. rolling mill of the Pittsburg Reduction Co. at New Kensington of about 210 × 70 ft., also the company's new works at Niagara Falls, 180 × 120 ft.; building for gas-producer plant for Carbon Steel Co., of Pittsburg, Pa., 310 × 30 ft.; warehouse for Union Iron & Steel Co., at Youngstown, O., 300 × 70 ft.; two steel bridges on cylinder piers for Hill county, Tex., also 170-ft. highway span for Wetzel county, W. Va.; two 100-ft. spans and one 70-ft. span for Columbiana county, O.; water tower for town of Milford, Ill.; one highway bridge span for town of Mosquito, Christian county, Ill.; 60-ft. turntables for the T. & M. Ry., and two 55-ft. turntables for the Toledo & Ohio Central Ry.; one 125-ft. drawspan for M. S. Cartter & Co., St. Louis, Mo.; one 100-ft. span on cylinder piers for Mitchell county, Tex., and iron roof trusses and beams for state armory building, Tonawanda, N. Y.

NEW COMPANIES.—Star Wrench Co., St. Louis, Mo.; $30,000; S. M. Frido and J. W. Donnell.

The Philadelphia Electric Storage Battery Renting Co., Philadelphia, Pa.; $300,000.

Star Boiler Works, Clinton, Ia.; $25,000; Pres., John T. Cullen; Treas., Daniel J. Murphy.

Pocohontas Coal Co., Birmingham, Ala.; $50,000; Robert S. McKnight, Chester W. Winn and J. A. Wiggs.

South Valley Coal Co., Petersburg, Ill.; $6,500; William N. Staley, John A. Braham and C. C. Brown, of Petersburg.

Standard Fire Brick Co., Ottawa, Ill.; $25,000; John W. Channel, Warren C. Raile and Howard W. Bach, all of Ottawa.

J. S. Patterson Construction Co., Chicago, Ill.; $25,000; Robert F. Kolb, James Cowan and George J. Cantway, of Chicago.

The Gem City Boiler Co., Dayton, O.; $25,000; John R. Brownell, Thomas E. Tucker, Frank D. Morrison and others, of Dayton.

Birmingham Brick Co., Birmingham, Mo.; $10,000; William Jackson, W. S. Cowherd and Claude Hardwicke, of Birmingham.

Rogers Paint Co., Birmingham, Ala.; $10,000; B. Rogers, W. H. Rogers, John H. Harrington and George E. Bush, of Birmingham.

Empire Asphalt Co., New York, N. Y.; $50,000; Frank A. McHugh and James J. Reid, of New York, and George E. Law, of Brooklyn.

E. B. Hayes Machine Co., Oshkosh, Wis.; $25,000; Eli B. Hayes and Joseph F. Hayes, of Oshkosh, and Stephen V. R. Hayes, of Milwaukee.

The Dansville Gas & Electric Light Co., Dansville, N. Y.; $25,000; W. W. Cramer, W. T. Spinning, Charles H. Rowe and others, of Dansville.

Morse Machine Co., Portland, Me.; $10,000, with $300 paid in; Pres., Alfred B. Morse, of Easton, Mass.; Treas., J. M. Morse, Boston, Mass.

Lafayette Engineering & Electrical Works, Lafayette, Ind.; $80,000; Pres., C. B. Robertson; Treas., H. P. Meigs; Consult. Engr., J. J. Flather.

Scott Motor & Machine Co., San Jose, Cal.; $500,000; B. W. Scott, N. R. Carson, San Jose; A. B. Acosta, John G. Fitch, L. H. Miller, Los Gatos, Cal.

Montana Gold Mining Co., Camden, N. J.; $600,000; W. J. Cheyney, of Absecon, N. J., and Edward F. Steck and Isaac W. McElwee, of Philadelphia, Pa.

Cottage Home Co., Norfolk, Va.; to build houses, operate cotton mills, etc.; Pres., John H. Hume; Vice-Pres., W. G. Parker; Secy., James A. Mulvay.

Mountain Beauty Gold Mining Co., Denver, Colo.; $2,000,000; James M. Parker, Maurice Finn, Fred M. Coombs and James L. Lindsey, of Cripple Creek.

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